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EDITORIAL

Vitamin D Milk Today

In 1955, the Council on Foods and Nutrition of the American Medical Association, with regret, announced that it no longer would accept individual brands of foods. The Council then reviewed the status of vitamin D milk. It was estimated that about 90 per cent of the fluid milk supply was being fortified with vitamin D, whereas twelve years earlier, only about ten per cent had been fortified. Coincident with the tremendous increase in the extent of fortification, there had been a gradual disappearance of rickets among infants and small children in areas where this deficiency disease had continued to exist through the 1940's. "A modern miracle" is what the Council called the final conquest of this once common condition. The accomplishment was attributed in large degree to the efficient manner in which the dairy industry was fortifying nearly all its fluid milk. The Council urged that the program be continued, even though circumstances prevented the further use of the Council's seal on labels and in advertising.

What has happened in the intervening years? The industry now is on its own. What are the problems it has encountered, and how has it solved them during the last several years? On this eve of the 30th anniversary of the vitamin D milk program, it is appropriate to take stock.

Although the vitamin D milk program was guided and supported by the A.M.A. Council for many years, it has always been a voluntary program, undertaken by the dairy industry in the interests of better health. Whereas enrichment of flour and bread are compulsory in about half the states, no law requires the addition of vitamin D to milk. The only way that consumers can know that vitamin D is in the milk they purchase is by reading the labels, and consumers do not read labels; at least they do not read them regularly, and with understanding. The responsibility for continuation of this health program thus rests almost entirely upon company management.

Today, as far as can be determined, it appears that the extent of fortification of milk with vitamin D is holding up very well indeed. The present situation is testimony of the awareness by executives of the dairy industry of the importance of vitamin D milk, especially for infants, small children, and their mothers. The continued efficient handling of this program represents an achievement for which the dairy industry may well be proud, and for which the American public can be truly grateful. There have been some obstacles, however, and mention of some of them may help in their solution, should they arise again.

There have been, for example, two new types of preparations offered to dairies in the recent past for the fortification of milk, both of which proved to be unsatisfactory. One preparation consisted of vitamin D dissolved in an oil, but it lacked an emulsifying agent. The resulting unequal distribution of the vitamin D produced a fortified milk of variable potency. This particular preparation was also packaged in a pressurized can, which bore directions that would not encourage careful measurement of the concentrate. The other preparation consisted of a wafer, which contained vitamin D; it lost potency on storage before it could be used. The suppliers of these preparations had reports of assays, made on the freshly prepared concentrates, to show to potential customers, but they had no reports of assays of vitamin D milk made with their products under commercial conditions. Such reports were obtained in due course by dairies which used one or the other of these preparations. It is likely that in the future dairies will demand proof of performance before they change their methods of incorporating vitamin D into products for which they alone are responsible.

The industry is beset not only by some ingredient suppliers, but at times by some of its important customers. In two major cities not long ago physicians were surprised to find some cases of moderate rickets among infants admitted to hospital wards. Inquiry revealed that one or two supermarkets had insisted that ordinary milk be supplied to their stores in place of vitamin D milk. There can be no doubt that the stores were able to secure a slightly lower cost-price on milk under such a stipulation. The trend toward a greater distribution of milk through stores, with fewer home deliveries, means that more business executives are involved in the decision as to whether or not the public is to get vitamin D milk. Fortunately, from the health point of view, the instances mentioned appear to have been exceptional, isolated cases.

The fruits of the vitamin D milk program can be seen everywhere in the straight backs, sturdy legs and well-shaped heads of little children. They can be seen in the admirable physiques of tall, well developed young men and women in high schools and colleges, and in the military services. Other preparations of vitamin D, and other health measures, have contributed to this harvest of good health, but vitamin D milk in large measure has assured the benefits of adequate vitamin D intake to virtually all children.

Except with occasional cases of refractory rickets, and other rare anomalies, professors of pediatrics today can no longer step into a hospital's children's ward and show medical students the rachitic rosary, craniotabes, bowed-legs, and the deformed pelvic bones of rickets, or the carpopedal spasms and tetany which once were associated with inadequate therapy of rickets. Occasionally, physicians may encounter cases of overdosage of vitamin D, or see patients with idiopathic hypercalcemia with failure to thrive, or patients with hypercalciuria accompanied by stones of the urinary tract. But these medical conditions are relatively uncommon in this country. If vitamin D is involved in their etiology, the dosages with which they are associated are greater than those which can be secured with the use of vitamin D milk.

The industry leaders who have participated in the planning, early struggles, and continued cultivation of the vitamin D milk program, the benefits of which are enjoyed by all Americans today, unfortunately are becoming fewer in number, as time takes its toll. They are being succeeded by younger men, many of whom have never heard of rickets, or seen bow-legged children. There is a need, therefore, for continued efforts to make certain that there shall always exist an awareness that vitamin D milk is important for the continued health and strength of the nation.

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Opinions expressed in this editorial are those of the author and are not necessarily those of this Association.

ACTIVITIES OF THE U. S. PUBLIC HEALTH SERVICE RELATING TO THE INTERSTATE MILK SHIPPER CERTIFICATION PROGRAM – 1959-1960[1]

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During the past two years, the Public Health Service has been able to discharge the responsibilities delegated to it by the National Conference on Interstate Milk Shipments in a manner more cosely conforming to the procedures set forth in the basic Conference agreements. A number of elements of our program have been strengthened including performance of the check-rating function, and the initiation of several research projects and special studies designed to improve the methodology, sanitation standards and evaluation techniques adopted by the Conference. In 1960, special action, in concert with the Executive Board of the Conference, was taken to realistically aproach and deal with the problem of antibiotic residues in milk shipped interstate from certified shippers. In addition, through an expanded program of seminars and training courses, efforts have been made to bring about a higher degree of uniformity in attitude and performance on the part of participating State agencies. Attention has been called to a number of other problems, which are recommended for Conference consideration.

In order to provide perspective for evaluation of this report, those functions which the National Conference on Interstate Milk Shipments has requested the Public Health Service to undertake will be reviewed briefly.

The representatives of those States who attended the First National Conference defined the role of the Public Health Service. They agreed that the primary role should be to bring about the highest degree of uniformity in attitude and performance on the part of State authorities so that any certification of an interstate milk shipper's supply could be accepted with confidence. To implement this role, the first and subsequent National Conferences recommended that the Service undertake the following specific functions:

1. Provide assistance in the training of State, local, and industry personnel engaged in milk sanitation activities, including laboratory activities.

2. Standardize the rating procedures of its own personnel, and those of State milk sanitation rating officials.

3. Publish the sanitation compliance and enforcement ratings of interstate milk shippers certified to the Surgeon General by responsible State milk sanitation rating agencies.

4. Perform a sufficient number of check-ratings to determine (*a*) whether the milk sanitation standards adopted by the Conference are correctly interpreted and enforced, and (*b*) whether the sanitation compliance status of listed shippers is maintained in the period between official rating surveys.

5. Review and evaluate the facilities, methods, and procedures of State laboratory agencies to determine (*a*) if laboratory examinations are performed in accordance with "Standard Methods for the Examination of Dairy Products," and (*b*) if procedures adopted by the National Conference for approval of local laboratories are being complied with.

6. Provide State agencies with interpretations of the *Milk Ordinance and Code* and the Public Health Service rating procedures as well as other information pertinent to the conduct of the voluntary certification program.

In reply to a request from the Conference for the Public Health Service to perform these functions, the Surgeon General responded that the Service would be willing to participate with the States in the conduct of a cooperative program for the certification of interstate milk shippers within the limits of available resources.

As reported at previous Conferences, the growth of the cooperative program was so rapid during the period, 1951-1959, that the Service, within available resources, could not adequately discharge all of the responsibilities delegated to it by the Conference. Since uniformity was basic to the success of the program, during the first five years of the program, the Service placed emphasis on *(a)* the training and standardization of State milk sanitation rating officers and on the training of State laboratory personnel; *(b)* assistance to States in the training of local supervisory and industry personnel; *(c)* assistance to States in the establishment of local laboratory certification systems, and in the development of acceptable split-sample programs; and *(d)* evaluation and approval of State laboratories. Inter-regional and intra-regional seminars were also conducted in order to promote the greatest possible degree of uniformity in the interpretation and application of the provisions of the *Milk Ordinance and Code* and the PHS recommended rating procedures. Also, in order to insure that all of the Conference criteria were considered by the States in the certification of interstate milk shippers, forms were developed for use by the States in reporting the ratings of shippers for listing.

The area of responsibility which initially we were

[1]Presented as Progress Report to the Eighth National Conference on Interstate Milk Shipments, St. Louis, Missouri, April 4, 1961.

not able to conduct in the manner called for by Conference agreements was the performance of a sufficient number of check-ratings to determine whether milk sanitation standards were being correctly interpreted and enforced, and whether the sanitation compliance status of listed shippers was being maintained between official rating surveys. At the Sixth and Seventh National Conferences, held in 1957 and 1959, we indicated that implementation of this function had presented problems in the development of a procedure which would provide the greatest amount of information in return for the time that could be devoted to this activity by our limited staff. We are very pleased to report to this Conference that late in 1959 some additional funds were made available which have permitted us to more adequately fulfill this responsibility.

PROGRESS REPORT—1959-1960

The following is a summary of our activities related to the certification program for the calendar years 1959 and 1960, and some of the problems encountered in the discharge of our responsibilities are indicated.

Training Activities

A great deal of emphasis was placed in 1959 and 1960 on the conduct of regional seminars for both State milk sanitation rating officers and State laboratory directors. It is our belief that such seminars provide a unique opportunity to develop a high degree of uniformity among States in the application of supervisory, laboratory, rating, and administrative procedures. At such seminars, time is provided for each participant to bring up problems and to benefit from group discussion. The Service also utilizes seminars to discuss problems it is encountering, and to clarify interpretations of technical or administrative provisions on which the States have question. Since the 1959 Conference, our regional offices have held 13 such seminars, including 3 of which were held in 1961. These seminars were attended by a total of 305 State milk sanitation rating officers and State laboratory directors.

In 1960, for the first time, the Service conducted at its Sanitary Engineering Center, a course on "Methods and Practices for State Milk Laboratory Survey Officers." This course was designed to provide training for State personnel responsible for approval of local laboratories examining milk for interstate shipment as requested by this Conference at its 1957 and 1959 meetings. Personnel from 21 State health departments and 8 other State agencies attended this course.

Because of the importance of the antibiotic and pesticide residue problem to the interstate milk shipper program, special attention was given in 1960 to training on this subject. Six courses were presented on detection of antibiotic and pesticide residues in milk, and one on the prevention of pesticide contamination. This latter course was a pilot course designed for utilization by State and local agencies and industry. These courses were attended by more than 200 individuals. Representatives of the PHS also participated in 12 specialized courses on methods for determination of antibiotic and pesticide residues in milk, which were conducted by the Food and Drug Administration in the spring of 1960. These courses were attended by approximately 130 persons.

In addition, in 1959 and 1960, two topical training courses on "Milk Sanitation Administration" and 33 courses on "Milk Pasteurization Controls and Tests" were conducted by the Communicable Disease Center of the Public Health Service. These courses were attended by 742 individuals.

Standardization of Rating Procedures

Since the last Conference, we have given increased attention to standardizing the rating procedures of PHS regional personnel to insure a uniform approach. Mr. Darold W. Taylor of our headquarters office has developed a protocol for this purpose, whereby he spends 4-5 days in the field with each man whose rating procedures are being standardized. The rating procedures and administrative techniques of each of our men are carefully evaluated, and emphasis is placed upon proper interpretation of the technical provisions of the *Milk Ordinance and Code*. No attempt is made to standardize the procedures of more than one man at a time. In 1959 and 1960, the rating procedures of 8 PHS regional representatives were evaluated. Since we have recently added a number of new men to our field staff, our standardization efforts will be stepped up in 1961. We are also in the process of developing a "Manual of Operations" to guide our regional personnel in the procedures to be followed by them in the conduct of our responsibilities in the cooperative interstate milk shipper certification program.

With regard to the standardization of the rating procedures of State milk sanitation rating officers, 110 such officials in 43 States have now been certified by PHS regional representatives. In 1959, the rating methods and interpretations of 49 State rating officers were standardized. Of this number, 14 were new State rating officers and 35 were men whose work had been previously standardized. In 1960, the rating procedures of 38 State personnel were standardized. Of this number, 9 were men whose work was being standardized for the first time. The

significance of these figures lies in the fact that, during the past two years, the Service has standardized the rating procedures of 79 percent of the total State men who are engaged in the rating of interstate milk shippers. A list of the names of the State milk sanitation rating officers whose work has been evaluated and certified was forwarded to all "State milk sanitation authorities" on June 10, 1960. We are in the process of developing, and will soon issue, official certificates to those milk sanitation rating officers and State laboratory survey officers whose work has been standardized by Service representatives.

Publication of Sanitation Compliance Ratings of Interstate Milk Shippers

The Conference originally requested publication of semiannual lists of the ratings of interstate milk shippers with supplements to be issued bimonthly. As pointed out to the Conference in 1959, it has proven more feasible for the Service to publish the list quarterly, and not to issue bimonthly supplements. It was suggested at the last Conference that this modification be noted in Conference agreements; however, the suggestion was not acted upon. Therefore, we again suggest that the Conference act on this matter in order that the basic agreements reflect actual practice.

For your information, the January 1, 1961 issue of "Sanitation Compliance Ratings of Interstate Milk Shippers" listed the names and ratings of 745 interstate milk shippers whose sanitation compliance status had been certified to the Public Health Service by 34 States. The average rating for all raw milk producers listed was 92.83 percent, and the average rating for pasteurization plants listed was 94.13 percent. The January 1, 1961 list included the ratings of 12 interstate shippers of Grade A dry milk products. Conference agreements do not specifically call for the listing of shippers of dry milk products intended for use in fluid milk products, even though it is believed that this was the Conference intent. Therefore, it is proposed that the 1961 Conference consider amending the agreements accordingly.

One matter concerning the listing of ratings of certified interstate milk shippers, on which the Conference acted in 1959, and which the Service has not complied with, relates to dividing the list into two parts based on whether or not the sanitation compliance rating of the shipper was 90 percent or above. The 1959 Conference recommended that when a shipper's sanitation compliance ratings were 90 percent or above, the shipper should be listed as 90 percent or above with no reference to the exact numerical rating, and when the shipper's ratings were below 90 percent, the exact numerical figure should be listed. However, guidance as to how this recommendation was to be accomplished, and the deadline for its implementation, was not provided in the Conference recommendation.

The Service gave considerable thought as to how this recommendation could be implemented, and came to the conclusion that it was administratively cumbersome, and possibly, an inconsistent and unsound procedure. Our views on inconsistency and unsoundness were based on the fact that the Conference has adopted no minimum rating as a prerequisite for listing, and to divide the list into two parts would be misunderstood and would reflect on shippers whose ratings were below 90 percent. Furthermore, since certified shippers must sign a release authorizing publication of their exact ratings, it would be necessary to obtain from each shipper, whose ratings were 90 percent or more, permission to list his name and products in the new "90 percent or above" category. We believed the obtaining of such permission would be difficult because shippers with high ratings would object for competitive reasons. In our judgment, a better procedure would be to limit eligibility for listing to those shippers whose raw and/or pasteurized products have achieved ratings of 90 percent or above, and then to omit the listing of exact numerical ratings. We recommend that the Conference consider such a course of action.

Check-Ratings of the Sanitation Compliance Status of Listed Interstate Milk Shippers

As mentioned earlier, because of limitations in staff and travel funds, we were not able during the first nine years of the program to make a sufficient number of check-ratings to validate the maintenance of the sanitation compliance status of listed shippers. Because the results of the intensive check-rating work of one regional office indicated that approximately 13 percent of the listed shippers' ratings did not accurately reflect the sanitation compliance status of their supplies, we were convinced that this aspect of our work must be strengthened. Therefore, when additional funds were obtained late in 1959, we directed our regional offices to place increased emphasis on check-rating activities in order *(a)* to cover shippers whose supplies had not been check-rated by the PHS in years, and *(b)* to establish an "index of reliability" for each participating State on the maintenance by its shippers, and supervisory agencies, of listed sanitation compliance ratings.

This increase in check-rating activity has been misunderstood and criticized by a few States. They have considered the check-ratings as an additional

check on the adequacy of their State milk sanitation rating officers and their State's rating program. This is not the case. The check-rating function relates to supervision, not to standardization of the procedures used by rating officers. It is a determination of how well the sanitation compliance status of a shipper's supply is maintained between official ratings, which as you know, can be as long as two years. We believe you will agree that the results of our check-ratings clearly show the need for surveillance of this type.

In the years 1959 and 1960, the Service conducted 351 check-ratings of the sanitation status of listed shippers. Of this total, 229 were conducted in 1960 as part of a special study to determine an "index of reliability" for each State on the ability of supervisory agencies within that State to maintain the compliance status of its shippers' supplies. As a result of check-rating these 229 shippers, our regional personnel found it necessary to request that 30, or 13 percent, be resurveyed because the sanitation compliance status of the farms and plants check-rated was significantly below the published ratings. The average deviation from the published ratings, on those shippers' supplies for which new ratings were requested, was 11 percent; the median deviation was 9.3 percent; and the greatest deviation from a published rating was 27.6 percent.

If one applies the 13 percent resurvey figure, which our personnel found to be necessary, to the 745 shippers listed in the January 1961 issue of "Sanitation Compliance Ratings of Interstate Milk Shippers," and statistically this would be sound, then the ratings of 97 shippers currently listed are significantly below the published figures. This is a matter which merits careful consideration by this Conference. Unless the sanitation status of interstate shipper supplies can be maintained between ratings, the integrity of the voluntary program is placed in jeopardy.

With regard to the establishment of an "index of reliability," which has been mentioned, considerable variation was found among the States in the maintenance of the sanitation status of listed shippers between official ratings. In one State, our regional personnel found it necessary to request new ratings on 50 percent of the shippers check-rated, and one shipper was removed from the list. In one of the PHS regions, new ratings were requested on 24 percent of the shippers check-rated in two States. In still another region, new ratings were requested on 18 percent of all the shippers check-rated.

Although it was found, in many States, that the listed ratings accurately reflected the sanitation status of the listed shipper's supply, the situation which exists in a few States poses a problem which this Conference should consider. For example, when the Public Health Service finds, through check-ratings, that the listed ratings of 50 percent of the supplies checked are not currently valid—or even 25 percent—what action should the Public Health Service take in addition to requesting new ratings, which is the only procedure prescribed by current agreements? The Public Health Service, when it publishes compliance ratings certified to it by the States, in effect, endorses and stands behind such ratings. Certainly, our agency cannot be expected to continue to publish such ratings when we have knowledge that the current status of a given shipper's supply is significantly below the certified rating. Thus, the question arises, in the case of significant deviations—for example, a drop in sanitation status of 10 percent or more below the published certified rating—shall the shippers in question be removed from the list, pending the results of the new rating surveys?

We would also like to ask the Conference, should the Public Health Service continue to accept certified ratings from a State, when our check-ratings show that an unusually high percentage of resurveys of the shippers checked are necessary? If not, what should this percentage be? Perhaps an alternate procedure could be developed as criteria for refusal to accept further State certifications. It has been suggested that the Conference require that each shipping State, which wishes to participate in the voluntary program, submit a request for endorsement of its work in which it agrees to conform to all Conference agreements and procedures, and that it has the staff and resources to do so. We are not sure of the advisability of such a procedure, but the Conference may wish to consider it along with other methods for maintaining a high level of program integrity.

Review and Evaluation of State Milk Laboratory Programs

During the past three years, representatives of our Sanitary Engineering Center have visited the central laboratories of 48 States and the District of Columbia. In 1959 and 1960, surveys were made of the laboratory practices of 25 States, including 15 of the 34 States whose shippers are currently listed. Without exception, the central laboratories were found in substantial compliance with "Standard Methods for the Examination of Dairy Products."

State compliance with Conference agreements pertaining to approval of local laboratories was found to be excellent. All of the States from which shippers are listed, and the District of Columbia, have programs for the approval of local milk laboratories. Ten other States also have such programs.

All of the States currently certifying interstate milk

shipper ratings have forwarded surveys of local laboratories to the Service during the past two years, and as of January 1, 1961, split-sample results had been received from all these States.

As a component of Service approval of State milk laboratories, series of split samples were sent to 47 States and the District of Columbia in 1959, and to 48 States in 1960. Phosphatase test results of pasteurized products showed a decided improvement over those obtained in 1958. A statistical analysis of the 1958 plate count results has been completed, and a paper describing such statistical analysis was recently published *(1)*. Standard plate counts of most samples showed fairly good agreement between laboratories in 1959 and 1960.

Split samples shipped by the Service in 1960 contained samples to be tested for antibiotics, and such tests were reported by all but one State. Generally, the results reported were in good agreement. Most laboratories reported penicillin in samples which had been prepared to contain 0.05 and 0.25 units per ml., respectively; however, occasionally, a laboratory failed to detect the antibiotics.

The PHS annually issues a list of State milk laboratory survey officers whose work has been approved and certified by the Service. The current list, October 13, 1960, includes the names of 58 individuals.

Since the 11th Edition of "Standard Methods" was issued, PHS "Survey Form for Milk Laboratories," form 1500, has been revised. Copies of this form may be obtained from our regional offices. Two new additions to the form have been included, one on simplified viable counts for raw milk and one on detection of residual penicillin; otherwise, the format is essentially the same as the previous form.

While on the subject of forms, we would like to call to the attention of the Conference that the first two pages of the form, "Sampling," are frequently not completed by State officials. In order for us to approve the State laboratory program, it is necessary that this part of the form be completed by a qualified State official—either the milk laboratory survey officer or the milk sanitation rating officer.

Special Studies

Two special studies have been undertaken by the Service of interest to this Conference. At the 1957 Conference, concern was expressed about false-positive phosphatase reactions and the occasional anomalous results reported, particularly for cream pasteurized at 161° F or higher. Research on this problem was undertaken by the Service which has resulted in the development of a method for differentiation of reactivated from residual phosphatase in high-temperature, short-time pasteurized milk and cream *(2)*. This method was recently subjected to a collaborative study and has been adopted by the AOAC as an official procedure.. The current survey forms for milk laboratories include this procedure.

We also initiated a study in 1960 which is designed to determine the impact of modern-day methods of handling and transporting milk, including bulk cooling, agitation, pumping and storage on the bacterial counts of market milk. A progress report on the results of the first phase of this study will be presented this afternoon by Dr. Richard Brazis of our staff.

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THE SANITARIAN'S ROLE IN THE NEWER CONCEPT OF ENVIRONMENTAL HEALTH[1]

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Our environmental concerns are with the air we breathe, the water we drink, the food we eat, and the places in which we work and live. These elements of our natural or physical surroundings or environment have been affected considerably by scientific, technological, economic and social developments of recent decades.

First, we are expected to add some 70 million people to our national population in the coming 20 years. This is almost equal to our total population at the turn of this century. It is about equal to the total population of France. At the same time, all of us are concentrating in urban areas. When a tremendous, expanding industrialization is added to the herded masses of human beings, the emergence of problems is inevitable.

New industries involve new manufacturing processes which spill new types of wastes into the Nation's watercourses. These wastes are chemically complex and have yet to be analyzed and evaluated for their immediate or cumulative toxicity. The developing nuclear technology involves not only public utility plants for the production of power but also university reactors for research and radioisotopes for industrial research and for medical diagnosis and therapy. Involved in all these activities are the problems of contamination and disposal of radioactive wastes. The revolution in food technology involves sanitary procedures in the storage, distribution, and sale of frozen and pre-cooked foods. Crowded city living conditions and more leisure time have forced greater attention to the sanitation of both old and new recreational facilities – swimming pools, gymnasia, community centers, lakes, and parks. Recently one speaker, appearing before a university commencement, stated that the United States faces a "quiet crisis" within its own borders as the spread of urban and industrial development continues. He emphasized that wrong decisions would be made at the peril of the oncoming generations.

Now, these conditions suggest very clearly that all practitioners in the public health field must raise their professional sights, sharpen their skills, and look forward to many new and different ways of attacking both old and new problems.

Much of the knowledge we need today and will need tomorrow is complex and elusive. At the Second Congress on Environmental Health, convened in Ann Arbor during the first week in June, we were told that studies of some long-range effects may not be concluded for several decades. Or, technologic progress will result in unpredictable problems – as with auto exhaust and smog. Therefore, you may say we are reaching for something beyond our grasp.

The question is "How can we get at the problems?"

Among other things that we can and must do, there is at the head of the list the need to think of environmental health problems in comprehensive as well as specific terms. The assaults of noxious substances upon the individual respiratory system are essentially the same, whether the source be inhalation directly from industrial processes or indirectly from general pollution in a community's atmosphere. Variation exists in degree, but not in kind. Disease from contaminated shellfish is as much a problem of food sanitation as it is a water pollution problem.

Communities may have their own special or accentuated problems. One has an air pollution problem, a second a water pollution problem, and a third may be suffering from concentrated industrial hazards. However, the fact remains that, whatever the problem, every person's health – and therefore the community's health – is threatened by an environmental hazard. Certain of these hazards may have common origins. A solution in one area may create problems in another.

The important and basic concept of environmental health, therefore, involves *all* of a person's exposures and reactions to all these physical surroundings. It is here that the theory of multiple etiology – or causative agent – of disease comes in strongly. We can no longer rely solely on one-to-one, medical cause-and-effect relationships. What causes lung cancer – smoking alone? Something else that we breathe?

Another important concept or action in facing the problems of a contaminated environment concerns the linking and organization of groups and conditions to produce comprehensive data. The various "intelligence" networks are examples. Thus, the Public Health Service is cooperating with dozens of State and local authorities in establishing, enlarging, and maintaining a water quality network and a milk

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sample network. The latter's purpose is to check radiation levels. The nation needs a comprehensive network to monitor the total diet, including both radiation and chemical aspects.

Still another change in the lineup of attack on environmental health problems involves the close and coordinated voluntary cooperation of various agencies in metropolitan areas – political, administrative, and civic, as well as health. Since many environmental health hazards respect no political boundaries and invade almost every sector of the economy, it is essential that a variety of skills and talents merge with a variety of levels of responsibility to overcome those hazards which debilitate the economy as well as the health of the community. Planners, economists, lawyers, politicians *and* physicians, engineers, sanitarians, and others in the health field *must* sit down together, organize and prosecute projects together, and link their respective talents.

On the "action front" also is the need to develop new procedures and approaches that take advantage of these new contacts in the light of the *total* rather than the splintered view of health problems. For example, our staff in the Public Health Service recently issued an *Environmental Health Planning Guide*. This publication links up and relates a number of technical and administrative services, does not explore any environmental health problem in depth, but does inter-relate engineering, economic, sanitation, and other approaches to possible solutions to community-wide health hazards.

I wish to report at this time that there is activity on the environmental health legislative front in Washington. Serious consideration is being given to the Milk Sanitation Bill – H.R. 50, which, for the first time, would provide a legislative base for the national interstate milk shipper certification program. This would provide uniform criteria for the large and growing volume of milk moving in interstate traffic. At the same time, we have been asked to assist in drafting legislation for interstate shellfish sanitation activities. Congress is considering bills relating to air pollution and water pollution.

This leads me to call your attention to the major reorganization currently under consideration in the Public Health Service. The administrative, financial, and scientific forces in the Service are being realigned to focus more sharply and clearly on the environment as a whole. Separate Bureaus are being formed, one to concentrate on the environmental health area, the other to be concerned with community health problems which are more directly medically related, such as tuberculosis, the venereal diseases, and cancer control programs. The plan also involves my own Division of Engineering Services, in which it is hoped to so rearrange Programs as to focus more effectively, from an operational and administrative point of view, on problems of particular concern to local agencies such as: milk and food, metropolitan planning, water supply, and general engineering activities.

Up to this point, I have identified some of the major causes of changes in our physical environment and suggested certain new or enhanced approaches and points of view in attacking environmental health problems. These approaches, these new and expanded plans of attack are predicated on the belief that we are, or will shortly become, properly trained and self-disciplined professionally to undertake successfully what has to be done.

There is no doubt that in a "tight" market for people in the health professions, many of us will have to double and triple in brass. Fortunately, it is also true that the very nature of our health problems and hazards makes the integrated and coordinated team approach essential. In the future, sanitarians will have to be as familiar with Geiger Counters and dosimeters as they are with inspection sheets. They may be taking and analyzing polluted water samples. They will be knowledgeable in the use of atmospheric pollution equipment. They will of necessity have a wide role in public health operations.

With these activities prominent either now or on the immediate horizon, it is heartening and encouraging to note the efforts being made by sanitarians, individually and collectively, to lift their professional sights. You are not alone, either. New problems require new skills, and all of us must sharpen our tools and learn new ways. Well over half the States now require at least college graduation for qualification as a sanitarian. More support is being given to schools for purposes of establishing graduate curricula and a great range of short courses. As you know, the Public Health Service has been offering graduate fellowships and traineeships in all health career areas, with awards to sanitarians ranking high on the list in terms of total number of awards.

It is my impression that in the yearning for higher professional status, the search is on for any gimmick to do the trick at the expense of the one *real* and *guaranteed* road to such status. Changing one's title will not do the trick. The mechanic suddenly becomes an engineer, the undertaker becomes a mortician, and the beauty shop operator becomes a cosmetologist. No one is being fooled, believe me. The public is too intelligent and sophisticated to fall for such switches. In the long run, the public *does* recognize and appreciate skill, knowledge, competence, and service, any evidence to the contrary

notwithstanding. Education and training result in skills and competencies, and the application and exercise of such skills and competencies result in recognition and status.

To this we add organization and professional self-discipline, not for purposes of establishing monopoly practices, not just for raising the group's visibility among other groups competing for attention, but for purposes of establishing, maintaining, and, if possible, enforcing standards of service.

In a society that has been taught to demand unusual public health standards, in a culture in which science and technology create environmental changes almost daily, the professional person aims at maximum standards of performance. The extent to which professional services rise above minimum requirements is directly proportional to the recognition and status the public will accord any special group. It seems to me that the path to greater professional competence, higher salaries, and enhanced public status is thereby clear. It may be unglamorous and unspectacular, but it is a true and solid and well-lit path.

I cannot conclude my remarks without noting a very desirable level of professional alertness, agressiveness, and competence to be found in this Association and in this State. The Crumbine Certificate of Merit is going to the Evansville-Vanderburgh County Health Department of this State for "outstanding achievement in the development of a program of food and drink sanitation." I understand that this is only the second time in the history of the Crumbine competitions that the Awards Jury has made this type of recommendation.

The importance of this achievement in relation to the health of your communities is emphasized when we note that, although the incidence of the infectious diseases has declined over the past decade, such has not been the case with foodborne illness. The level of reported outbreaks has risen steadily between 1952 and 1959, the last year for which such figures are available. Further, while outbreaks of foodborne illness reported to the National Office of Vital Statistics involve approximately 10,000 persons annually, that office estimates that if accurate reporting of all such illnesses could be achieved, the incidence of foodborne illness in this country would probably exceed one million cases annually. In view of the magnitude of the foodborne illness problem, the increasing complexity of food protection, and the press of the new problems of environmental health, it is indeed inspiring to come upon an area which has achieved such excellence in its food and beverage sanitation program.

Quite obviously, this award is not the result of unilateral action by the Health Department, the industry, or the public. Rather, it serves as a testimonial to the cooperative spirit of the county as a whole. An informed public, knowledgeable of fundamental public health objectives, is a recognized "must" in the success of any program. By being so informed, the citizens of this county have apparently stimulated and given support to both official agency and industry efforts toward established objectives. The Crumbine Award eloquently testifies on the importance of local agencies as a means of "retailing" health services to the consumers — the public. And here we are speaking not of the traditional organization but one attuned to the complex of modern urban society.

This observation, I feel, bears out my earlier contention; namely, that when competent, efficient service is rendered, recognition and status follow. This Association's record is good. You have spoiled your client and set your own standards at such a level, apparently, that you are committed to the goal of even higher levels. This is as it should be — good for the public, good for the Association, and good for the professional disciplines involved.

THE PRESENT STATUS OF THE ERADICATION OF TUBERCULOSIS AND BRUCELLOSIS IN CATTLE[1]

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Tuberculosis and brucellosis in the cattle population of our country have taken a tremendous toll during the past years. Fortunately, the livestock producers of the United States have developed the philosophy that animal diseases should be eradicated, whenever possible, rather than be allowed to continue in their herds and flocks. This philosophy has helped to maintain our high standard of living, and to a great extent has raised the economic status of our country. This decision was first made in relation to tuberculosis in cattle back in 1917, when the tuberculosis eradication program was initiated. At that time, almost 5 percent of all the cattle in the United States were infected with the disease. In the States with a high concentration of dairy cattle, the percentage of infection was much higher. Diseased animals moved without restriction from farm to farm. Calves nursed infected dams, and drank pooled, unpasteurized milk, which served as almost certain sources of infection.

Infected animals remained in the herd until they died of the disease, until they became emaciated and an economic liability, or until the disease had progressed to the point where it could be diagnosed clinically. The annual losses to the livestock industry would be difficult to calculate, but they were enormous.

Twenty-three years later, in 1940, the incidence of tuberculosis in cattle had been reduced to less than one-half of one percent in all States, and the entire nation achieved a Modified Accredited status.

During the next 12 years, the number of reactors found continued to decline until, in 1952, the disease hit a low point of 0.11 percent of all animals tested, or 11 animals in each 10,000. Since the incidence of infection had continued to drop during and after the war, in spite of a shortage of personnel and a decrease in the amount of testing, a false sense of security was established. Most people felt that the disease had been licked. Public interest shifted from tuberculosis to other diseases. As tuberculosis received less and less emphasis, funds for testing, research, and education dwindled, while costs to conduct such programs rose.

The low point of 0.11 percent, achieved in 1952, became not a point in our progress towards eradication but a plateau, a holding point, during the next two years.

In 1955 the number of reactors started to rise. It continued to climb until, in 1959, a total of 23 out of every 10,000 animals tested were tagged as reactors – the number of reactors had doubled in four years.

To combat complacency and to revitalize the tuberculosis eradication program, three major conferences on tuberculosis were held in 1958 and 1959, in Michigan, Wisconsin, and Kansas. At these meetings, national authorities on tuberculosis research, education, and regulatory problems, reviewed, evaluated, and discussed program procedures, testing techniques, and equipment, and the effects of human and avian tuberculosis.

Conferences at Denver, Colorado, and at Charleston, West Virginia, during the past year, brought together laboratory personnel from State, Federal, university and other research and diagnostic laboratories, to review laboratory procedures and problems, to standardize techniques, and to stimulate tuberculosis research.

Our basic tool for the eradication of tuberculosis was, and still is, the intradermal tuberculin test. Its effectiveness is demonstrated by the results described, and by the experience of many other countries throughout the world.

Early workers with this product recognized certain inherent weaknesses, which though insignificant in the early phases of the program, would assume greater significance as the incidence of infection approached zero. Other forms of tuberculosis can, in some instances, produce hypersenitization to tuberculin, and some degree of response to the test. At the inception of the program, therefore, eradication was not directed exclusively to cattle, but to other livestock and to poultry as well. To completely eradicate tuberculosis in cattle, it may be necessary to eliminate tuberculosis from all species, including man.

In the fiscal year 1960, approximately 2½ percent of all swine slaughtered in Federally-inspected establishments showed some evidence of tuberculosis. Almost 6,000 carcasses were condemned. While these figures represent a marked reduction during the past 40 years, they show that tuberculosis is still with us,

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presenting a real challenge to our program. Relatively little poultry testing is being performed at the present time, but avian tuberculosis presents a problem in some areas. Most swine infection is of avian origin. It is anticipated that increased utilization of laboratory facilities will demonstrate avian infection in a significant number of cattle. Paratuberculosis is also a disease to be reckoned with, since *Mycobacterium paratuberculosis* is capable of producing tuberculin sensitization in cattle. Acid-fast bacteria in so-called skin lesions may be a factor. Possibly other bacteria or factors as yet unknown may be involved. Field studies and research projects, now under way in several areas, will assist in providing additional information concerning these and other related problems.

It should be understood that requirements for the reaccreditation of herds and areas, as outlined in the Uniform Methods and Rules for Tuberculosis Eradication, represent minimum standards.

Several States test more than the required number of cattle, and we feel that additional testing, when economically feasible, is desirable and contributes substantially to the progress of the eradication program. This is especially true in areas of high cattle concentration.

During the past fiscal year, nearly 9½ million cattle were tested for tuberculosis. This is the greatest number tested in a single year since 1954; 0.15 percent of that number were classed as reactors, which is an improvement over the previous fiscal year when 0.23 percent reactors were found as stated previously. This is quite an improvement but we must continue to guard against complacency in our efforts for complete eradication of this disease. The eradication of tuberculosis in cattle is a goal well worth our efforts. We must continue to reduce the incidence of the disease until it no longer exists in our country.

The concerted effort to control and eradicate brucellosis in this country was started in 1934. Testing during the early years of the program indicated that there were approximately 4 million diseased cows in some 1¼ million infected herds. Economic losses were estimated to be in excess of 100 million dollars each year. The effects of war were also felt by the brucellosis eradication program and ground was lost during that period. Fortunately, an effective vaccine against the disease was introduced in 1941. By conferring a relatively high degree of resistance in most animals vaccinated with Strain 19 *Brucella* vaccine, it then became possible to limit or slow the spread of infection until diseased animals could be located and eliminated. This vaccine has stood the test through the years; 6½ million calves are now being vaccinated annually. It is desirable that this number be increased to help protect the status that has been attained.

Today more than 90 percent of the brucellosis that once existed in the United States has been eliminated. Once we had more than a million infected herds, but the disease was found in only 32 thousand last year. All States in the Union are actively participating in complete area programs designed to wipe out the disease, county by county. 2,100 counties (two-thirds of all counties in the Nation) have been completely tested and are now Modified Certified Brucellosis Areas. All counties in 26 States plus Puerto Rico and the Virgin Islands have reached that status. This means that not more than 1 percent of the cattle in not more than 5 percent of the herds were found to be infected at the time of qualifying for certification. Infected herds are quarantined and retested until the disease is eliminated.

Across the nation there are 360 counties now conducting complete testing leading to certification, leaving only 692 yet to join the program. By 1965 all counties in the Nation will have had an opportunity to participate. If any counties remain after that date, it will be only because the livestock owners have not yet requested area participation. All States should urge neighboring areas to move toward eradication as rapidly as possible, for reintroduction of the disease will certainly be more difficult if all areas approach eradication simultaneously.

One of the most important factors in the brucellosis eradication program was the development of the milk ring test. By this test almost a million commercial dairy herds are screened for suspicious reactions every 4 to 6 months. Only the suspicious herds and those not covered by the screen test need be blood tested. This has eliminated more than 97 percent of the testing of dairy herds and has permitted the concentration of blood testing activities in those herds most likely to be infected. Costs have been reduced greatly and the services of the limited number of available veterinarians have been effectively utilized.

Another program which promises to be nearly as effective as the milk ring test in finding infected herds is the testing, at time of slaughter, of properly identified beef and dairy cows. Blood test reactors among such cattle will point suspicion toward the herds from which they originated. These herds can then be blood tested and the disease eliminated. This program, called "the market cattle testing program," has already proved a boon to beef producers in many western States, and is being adopted in the east as well. Obviously, the more often we can screen our herds, the more quickly the disease will be found. Eradication will depend upon prompt detection of infection wherever it may occur.

The northeastern States have led the Nation in the eradication of brucellosis. All have achieved modified-certified status. North Carolina was the first State, New Hampshire and Maine - second and third. South Carolina, Virginia, Illinois, Ohio, and Kentucky are expected to join the ranks of the modified-certified States during the next two years. All but six States have set goals of modified-certified status by 1965 or before. Alaska, Florida, Louisiana, Ohio, Texas, and Wyoming have not as yet established such goals. However, it certainly would appear that the entire nation could be modified-certified by 1966.

A new category has been added to the status of areas in the brucellosis program during the past year. It has been given the name of Certified-Brucellosis-Free area. One State has moved on to this enviable position. New Hampshire was recognized as brucellosis free in April of last year by eliminating the disease from the last known infected herd. Three more States, Maine, Rhode Island, and Connecticut, all New England States, hope to qualify for State-wide brucellosis-free status during this calendar year.

There are thirty-four counties in eight States other than New Hampshire which have qualified as brucellosis-free. These counties are in Maine, Massachusetts, Minnesota, New Jersey, North Carolina, Pennsylvania, West Virginia, and Wisconsin. Naturally, we look forward to the day when the entire nation can be so classified.

Although the livestock industry and all others involved can take a great measure of pride in past achievements, we must take a realistic look at the task ahead. While the majority of herds have been freed of brucellosis by blood testing, removing diseased animals, vaccinating, and cleaning and disinfecting the premises, some have remained infected. Specially trained veterinarians are now working in many of the certified States to clean up these "problem herds." These men are equipped to apply a number of supplemental tests and procedures which aid materially in locating and eliminating brucellosis. Because of the intensive nature of the work of these "epidemiologists," they work most effectively in areas where the disease has been reduced to a very low level and where they have the complete cooperation of the livestock owners. Under their supervision, "problem herd" lists are shrinking at a gratifying rate in all certified States. For instance, reactors are being found in 45 percent fewer herds this year than last in the certified States. In 1960, only 5,727 infected animals were found in the eleven northeastern States - Maine, New Hampshire, Vermont, Connecticut, Massachusetts, Rhode Island, New York, Pennsylvania, New Jersey, Delaware, and Maryland. There is a total cow population of almost 4 million in these States.

When brucellosis reaches such low levels there is a real danger of complacency entering the picture and nullifying efforts to finish the job. This we learned from our tuberculosis eradication program. We must attack the problem with renewed vigor and enthusiasm in all areas if we are to be successful in eradicating brucellosis.

Because of our large cattle population, the seemingly endless movements in our markets and other channels of trade, the degree to which both tuberculosis and brucellosis had become established before eradication programs were initiated, and because of other factors; it is generally recognized throughout the world that the programs to eradicate tuberculosis and brucellosis in this country are the greatest attempts to eliminate animal disease ever undertaken in history. The progress being made is indicative of the success that is bound to come, if all segments of the industry continue their efforts in support of the programs.

BUTTERFAT SHRINKAGE IN FARM MILK COOLING TANKS

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A manufacturer of farm milk cooling tanks will devote more time to the development of the agitator than any other part of these units due to the problems involved; the drive unit used, design of the agitator, shape and depth of the tank, rate of introduction of milk into tank, composition of milk, rate of cooling, and amounts of milk in the tank.

Fortunately, the people involved in 3A work (International Association of Milk and Food Sanitarians, The United States Public Health Service and The Dairy Industry Committee) are aware of these problems and have been quite thorough in the preparation of this section of the 3A Standard for Farm Milk Cooling and/or Holding Tanks. These Standards require that the agitation be sufficient to provide homogeneity after not more than five minutes of agitation. Homogeneity in this case means not more than 0.2% fat variation in samples taken from various depths and distances from the agitator. A tank manufactured by any one of the 32 manufacturers authorized to apply the 3A symbol will have to conform to the above requirement.

Every manufacturer has, at one time or another, received a complaint from a dairy farmer indicating that his butterfat test is lower than anticipated since he installed his tank. The fact that these complaints originate all over the country in all kinds of herds, makes it difficult for the manufacturer to determine the exact cause without investigation. He must find out if the dairyman is correctly operating the tank, if the milk is being agitated properly, if the dairy farmer is comparing the fat tests with those he received when he shipped in cans, or is comparing them with his herd average.

Early in the farm tank program it became apparent that dairy farmers converting from cans to tank during the winter months frequently gain in butterfat test. This is especially true when the can is transported long distances and sufficient time elapses for the cream to freeze in the neck of the can. Too often the frozen cream is left in the can and not transferred to the receiving tank. As a result, the test taken from the receiving tank is frequently many points below the actual test.

Many complaints of butterfat shrinkage have been traced back to over enthusiastic tank sales personnel having promised the farmer an increase in butterfat tests that never materialized. All manufacturers guarantee *only* that *a more representative sample may be taken from the tank.*

A farmer operating under a production testing program should, of necessity, have a D.H.I.A. supervisor capable of conducting a test that should theoretically produce a set of figures for butterfat test and total production that equal or closely parallel the test and weight taken from the tank by the plant tester, providing they are comparing data taken from the identical supply of milk. However, there are isolated cases where milk weights vary thousands of pounds per month and butterfat tests differ as much as 0.7%. Usually these variations occur where the dairy farmer is not interested in economical production, but rather in establishing a record for his herd. Too often D.H.I.A. day is a "special day" for this type of dairy farmer. The start of milking may be delayed an hour or more. (A delay of one hour means a 1/24 possible increase in production.) Milkers are left on longer than usual. Scales of questionable accuracy may be used for weighing. Feeding may be increased so that the second milking is a special one aimed at increased production.

In any case, one must ask, "Is the herd average comparable to the tank pay-off?" Perhaps the milk sold or consumed on the farm is selected from the best cow, or dipped from the tank without proper agitation. Who can say that a cow will produce butterfat at a uniform daily rate or that the quanity will not vary from day to day? Surely care of samples after collection, in transit, in storage, plus sound testing procedures are necessary to secure accurate data.

Data received recently from one D. H. I. A. tester indicated that butterfat-shrinkage is greater in tanks where the tank truck arrives late in the afternoon. The same report indicated that the hauler ran the agitators from 32 seconds to a maximum of 2 minutes prior to sampling. No explanation for the improper timing was made, yet the data was forwarded to the

tank manufacturer in the nature of a complaint of butterfat-shrinkage. Perhaps tanks were only partially filled and the hauler reduced the time accordingly. *Partially filled tanks may be more difficult to agitate than a full tank because of the shape of the tank and reduced effectiveness of the impeller. The five minute period of agitation prior to sampling should not be reduced.*

Manufacturers have increased agitator impellor area and velocity to a critical point where further increases may cause excessive churning. Here it seems important to remind everyone that butterfat is measured in percentage. To reduce 2000 lbs. of 4% milk to 3.9% milk requires the removal of 2 lbs. of butterfat. The appearance of minute particles of churned fat in a tank, though undesirable, will not materially change the butterfat test and may not necessarily indicate improper agitation.

If stratification coupled with insufficient time for agitation prior to sampling is one of the causes of butterfat-shrinkage, then possibly the answer lies in using an interval timer. Timers automatically operate the mechanism to propel the agitators three minutes out of every hour. Timers can be manually set to five minutes to eliminate guess work in the length of time the agitator operates prior to milk sampling.

In addition to providing homogeneity the agitator must move milk over the evaporation area with sufficient velocity to eliminate freezing and promote proper heat transfer. Therefore, agitation is a necessary adjunct to the refrigeration system.

As freezing and churning are hazards to proper sampling the proper operation of the agitator is imperative.

Precooling of the empty tank in hot weather is recommended by most manufacturers. The condensing unit of a direct expansion tank should not be allowed to run continuously until the agitator thoroughly stirs the milk, unless the rate of introduction of the succeeding increments of milk into the tank is sufficient to prevent the freezing of the first milk entering the tank.

On subsequent milkings both the agitator and the refrigeration system should be placed in operation when warm milk is introduced.

SUMMARY

1. Manufacturers of farm milk cooling tanks design agitators that will create homogeneity after five minutes of agitation.

2. Butterfat-shrinkage in bulk milk handling can occur because samples of improperly mixed milk are collected and/or milk is excessively agitated.

3. After a representative sample is obtained, it must be cared for in transit and in storage, and must be properly tested and recorded.

4. Comparative fat test data can be valid when tests are run on the identical milk supply.

5. Proper operation of the tank controls is a must in bulk milk handling.

ANTIBIOTIC RESISTANCE AND ACID PRODUCTION AMONG STARTER CULTURES BELONGING TO THE GENUS STREPTOCOCCUS[1]

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The susceptibility to penicillin of a wide range of single strain cultures of lactic streptococci was determined. Approximately 50% of the strains studied exhibited resistance to penicillin at the 0.1 unit/ml level. Eight of these cultures were adapted to grow in the presence of 0.5 unit penicillin/ml, but they were unable to produce acid at a rate or quantity equal to that of their sensitive parent strains. Cultures obtained from naturally resistant isolates produced more acid in the presence of low penicillin concentrations than their sensitive parent counterparts, but less than that produced by "trained" resistant strains from the same parent origin.

The presence of low levels of antibiotics in the milk supply has posed many problems for the dairy industry. From the manufacturer's viewpoint, the decreased acid production by starter cultures as a result of antibiotics is of great economic significance. Suggestions such as the use of penicillinase, excessively large quantities of starters, or antibiotic-resistant starter cultures have been offered *(3, 5, 11)* as means to avoid or overcome slow down in acid production or complete starter failure.

Much of the work of previous investigators on the effect of antibiotics on starter organisms was done with commercial mixed cultures, of which the strain composition was unknown. However, investigations with *Streptococcus cremoris, Streptococcus lactis, Streptococcus durans, Streptococcus diacetilactis* and *Streptococcus thermophilus (2, 4, 5, 6)* have indicated that penicillin concentrations between 0.05 and 0.5 unit/ml milk are sufficient to reduce acid production by these cultures to a degree that would impair the cheesemaking process.

The objectives of the study reported herein were: *(a)* to determine the resistance to penicillin of a wide range of single strain cultures of lactic streptococci; *(b)* to increase, by a training program, the resistance of those cultures which tolerated low levels of penicillin; and *(c)* to isolate naturally resistant cells from selected cultures in order to attempt to obtain satisfactory acid producers.

[1]Article No. 18:60, Department of Dairy Technology, The Ohio State University. Supported by a grant from the United States Public Health Service.

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Experimental Results

Survey of lactic streptococci for penicillin resistance

A total of 35 strains of lactic acid producing-streptococci, including 18 strains of *S. cremoris*, 13 strains of *S. lactis*, 2 strains of *S. diacetilactis* and 2 strains *S. thermophilus* obtained from culture collections in the United States, New Zealand and Australia, were screened for susceptibility to low levels of penicillin. The criterion of susceptibility was the amount of acid produced in sterile skimmilk containing 0.1 unit penicillin/ml compared to that developed by the same culture in plain skimmilk. Inoculation was at the rate of 1% with a 16 hour culture. Incubation was at 30°C with titratable acidity determined after 2, 4, 6, 8, 12 and 24 hours. Nineteen of the cultures were unable to produce appreciable amounts of acid under the stated conditions. The remaining 16 cultures produced titratable acidity values of 0.28 to 0.74% in eight hours. Although this was usually somewhat less than the control culture, it did indicate some measure of resistance to penicillin.

The 16 cultures which grew in the presence of 0.1 unit pencillin/ml were subjected to further studies to determine their resistance to a range of penicillin concentrations from 0.1 to 1.0 unit/ml. Results, representative of five of these cultures (3 strains *S. lactis* and 2 strains *S. cremoris*), presented in Table 1, indicate a high degree of resistance to 0.1 unit penicillin/ml. After six hours incubation, the decrease in acid production was only from 0.1 to 0.05% for four cultures while acid produced by culture *S. cremoris* US[3] was decreased by 0.12%. After 24 hours incubation, the titratable acidity values were 0.05 to 0.12% less than the controls.

None of the cultures produced satisfactory acid levels in the presence of 0.25 unit or more of penicillin/ml. The levels of acid produced after eight hours of incubation in milk containing 0.25 unit/ml were 0.32 – 0.48% less than the controls. Titratable acidity values after 24 hours incubation revealed that culture *S. cremoris* US[3] was completely inhibited by 0.5 unit penicillin/ml. Acid production by all cultures was completely inhibited by 1.0 unit penicillin/ml. Results obtained with the remaining 11 cultures (6 strains of *S. lactis* and 5 strains of *S. cremoris*) were in agreement with those presented in Table 1.

DEVELOPMENT OF PENICILLIN RESISTENCE

Attempts were made to increase the level of penicillin resistance of the cultures which had demonstrated some degree of natural resistance. The cultures were subjected to a "training program" which consisted of repeatedly transferring them into milks containing a low level of penicillin. The first transfer was into milk to which was added 0.1 unit penicillin/ml. After each culture clotted, it was transferred to milk containing a slightly higher penicillin concentration. This process was repeated until the cultures consistantly were able to produce sufficient acid, in the presence of 0.5 unit penicillin/ml, to clot the milk. This "training" required approximately 10 transfers and was successful with eight of the 16 cultures.

Subsequently, titratable acidity produced by these cultures and their sensitive parent strains was determined after 8 and 24 hours incubation. Values typical of those obtained on several occasions are presented in Table 2. These data demonstrate that none of the resistant cultures obtained by the training process were able to produce as much acid as their parent strains. The difference between resistant and sensitive counterparts was very marked at eight hours incubation but became less by 24 hours incubation. Culture S. *lactis* C^{10}, resistant, produced more acid than any of the other cultures in eight hours; i.e., the titratable acidity produced by it was only 0.18% less than that by the parent strain. The decrease in acid developed by the other seven resistant strains, compared to their parent sensitive strains, was 0.25 to 0.57%.

TABLE 1—EFFECT OF PENICILLIN ON ACID PRODUCTION BY S. *lactis* AND S. *cremoris*.

Hours incubation	Penicillin concentration	Percent titratable acidity				
		S. lactis			S. cremoris	
	(U/ml.)	H1	C^{10}	924	806	US^3
	0	.67	.70	.64	.70	.58
	0.10	.66	.65	.61	.65	.46
6	0.25	.30	.28	.33	.30	.27
	0.50	.21	.22	.20	.19	.18
	1.00	.20	.21	.20	.18	.17
	0	.76	.76	.79	.79	.69
	0.10	.74	.74	.73	.73	.58
8	0.25	.44	.41	.34	.31	.34
	0.50	.21	.21	.20	.22	.20
	1.00	.20	.21	.20	.20	.16
	0	.86	.83	.86	.84	.85
	0.10	.83	.79	.84	.78	.68
12	0.25	.44	.44	.35	.30	.35
	0.50	.22	.22	.22	.21	.21
	1.00	.20	.21	.21	.20	.21
	0	.90	.93	.92	.91	.80
	0.10	.81	.84	.87	.85	.68
24	0.25	.44	.48	.45	.52	.51
	0.50	.36	.44	.42	.29	.20
	1.00	.22	.18	.20	.21	.19

TABLE 2—ACID PRODUCTION BY CULTURES OF S. *cremoris* AND S. *lactis* TOLERANT OF 0.5 UNIT PENICILLIN PER ML.

Culture	Percent titratable acidity			
	8 hours incubation		24 hours incubation	
	Sensitive	Resistan. (trained)	Sensitive	Resistant (trained)
S. *lactis* 924	.73	.41	.90	.78
S. *lactis* C^{10}	.75	.57	.88	.82
S. *lactis* H1	.74	.28	.92	.88
S. *lactis* H-1-R	.77	.20	.89	.75
S. *lactis* F1K	.52	.27	.87	.45
S. *lactis* T13b	.69	.33	.94	.62
S. *cremoris* 806	.76	.30	.90	.74
S. *cremoris* US^3	.66	.27	.87	.78

Because the resistant strain of S. *lactis* C^{10} was able to produce appreciable acid when grown in the presence of 0.5 unit penicillin/ml, comparisons were made between this culture and its parent strain when grown in milk containing penicillin concentrations up to 1.0 unit/ml. Representative results of these studies, presented in Table 3, illustrate that in the absence of penicillin, the tolerant strain did not produce acid as rapidly as the sensitive strain, and the total acid produced was somewhat less. For example, after eight hours incubation the titratable acidity of the sensitive parent culture was 0.66% compared to 0.54% by the penicillin tolerant culture. This trend was maintained at each sampling time. In the presence of penicillin levels greater than 0.1 unit/ml, the tolerant culture produced appreciably more acid than the sensitive culture, *i.e.*, 0.50% titratable acidity, compared to 0.22% after eight hours incubation in the presence of 0.25 unit penicillin/ml. A penicillin concentration of 1.0 unit/ml prevented acid production by the tolerant culture comparable to that of the sensitive culture at 0.25 unit/ml.

Isolation and activity of naturally resistant mutants

The 16 cultures originally selected, on the basis of their ability to produce acid in the presence of 0.1 unit penicillin/ml, were assumed to contain some cells which possessed a high level of penicillin resistance, although the population as a whole was not highly resistant. Therefore, attempts were made to isolate these penicillin resistant component cells and, after propagation of the cultures so obtained, to determine their ability to produce acid in the presence of penicillin.

Two procedures were used to make these isolations. The first employed Plate Count agar, to which was added from 0.1 to 10.0 units penicillin/ml. This was

TABLE 3—COMPARISON OF ACID PRODUCTION BY PENICILLIN SENSITIVE AND PENICILLIN TOLERANT S. *lactis* C[10]

Hours incubation	Penicillin concentration (U/ml.)	Percent titratable acidity	
		Sensitive	Resistant (trained)
	0	.57	.32
	0.10	.46	.32
6	0.25	.22	.32
	0.50	.20	.30
	1.00	.18	.20
	0	.66	.54
	0.10	.60	.52
8	0.25	.22	.50
	0.50	.20	.40
	1.00	.18	.22
	0	.72	.67
	0.10	.65	.65
10	0.25	.22	.60
	0.50	.20	.48
	1.00	.18	.22
	0	.76	.72
	0.10	.70	.72
12	0.25	.23	.66
	0.50	.20	.53
	1.00	.18	.22
	0	.89	.83
	0.10	.75	.83
24	0.25	.33	.78
	0.50	.21	.56
	1.00	.18	.23

seeded at the rate of 1 ml. of a 10^{-6} dilution of a 16 hour old culture per 10 ml agar. The plates so prepared were incubated at 30°C for 48 hours. The colonies which grew were subcultured in sterile skimmilk. By the second approach, Plate Count agar containing no penicillin was seeded similarly, and after the plates prepared from this mixture had solidified, filter paper discs soaked in penicillin solutions containing 1.0 to 100.0 units/ml were placed on the agar surface. After 48 hours incubation at 30°C, confluent growth of all cultures appeared at the edges of the discs containing 2.0 units/ml, while small zones of inhibition appeared around the discs soaked in the 5.0 units/ml solution. At higher concentrations, larger zones of inhibition appeared, and the isolated colonies growing within this area were subcultured for further study. By use of these techniques, "naturally" resistant cultures were obtained from five of the original 16 cultures.

The isolates were subcultured three or four times in sterile skimmilk after which acid production was compared with that of their sensitive and "trained" resistant counterparts. Titratable acidity determinations were made after 8 and 24 hours incubation at 30°C in the presence of graded levels of penicillin up to 1.0 unit/ml. Similar results were obtained with each of the five culture series. The results obtained with S. *lactis* C[10] were typical and are presented in Table 4. These data reveal that, in the absence of penicillin, both the sensitive and naturally resistant strains were capable of greater acid production than the resistant culture obtained by the training process. However, in the presence of penicillin concentrations of 0.25 and 0.5 unit/ml, the adapted resistant culture produced appreciably more acid than its counterparts. After eight hours incubation in milk containing 0.25 unit/ml, the adapted resistant strain produced titratable acidity of 0.50% compared to 0.29% and 0.22% by naturally resistant and sensitive strains respectively. A similar trend was observed after 24 hours incubation in the presence of both 0.25 and 0.5 unit penicillin/ml.

DISCUSSION

Lactic acid producing bacteria of significance to the dairy industry reportedly vary widely in their ability to produce acid in the presence of residual quantities of antibiotics *(8, 10)*. Results with 35 single strain cultures employed in the present study demonstrated that low levels of penicillin in milk retard acid production, but that an appreciable portion of starters are able to produce some acid in the presence of such penicillin concentrations.

The possibility of employing antibiotic-resistant starters in commercial operations has been suggested, but several investigators have reported *(1, 9)* that such cultures do not produce acid at a rate equal to that produced by sensitive cultures nor suitable for manufacturing purposes. The large collection of cultures employed in the present study, and the results obtained with cultures which were trained to tolerate penicillin, or which were obtained from isolated naturally resistant cells, are added evidence to substantiate the previous views that resistant cultures do not provide the solution to the problem of slow

TABLE 4—COMPARISON OF ACID PRODUCTION BY PENICILLIN SENSITIVE, NATURALLY RESISTANT AND "TRAINED" RESISTANT STRAINS OF S. *lactis* C[10]

Hours incubation	Penicillin concentration (U/ml.)	Percent titratable acidity		
		Sensitive	Resistant (naturally)	Resistant (trained)
	0	.66	.63	.54
8	0.25	.22	.29	.50
	0.50	.20	.20	.40
	1.00	.18	.18	.22
	0	.89	.90	.83
24	0.25	.33	.53	.78
	0.50	.21	.25	.56
	1.00	.18	.19	.23

vats or complete starter failures due to the presence of penicillin.

The assumption that cultures which grow in the presence of low levels of penicillin probably contain some cells which are resistant to higher levels appears invalid in the present study. This is suggested by the fact that the naturally resistant cultures produced no more acid in the presence of 0.5 unit penicillin/ml than their sensitive parent cultures. However, it has been established well *(1, 7)* that acid production is not a true measure of the ability of lactic acid bacteria to tolerate antibiotics or to multiply in the presence of such compounds. Apparently, antibiotic resistant starters may multiply at a normal rate, but in the process of development of resistance, their ability to convert carbohydrate to lactic acid is altered.

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A SIMPLE PNEUMATIC TESTER FOR CHECKING AND SETTING PRESSURE SWITCHES FOR HTST BOOSTER PUMP CONTROL

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Milk plant operators frequently desire to use an auxiliary booster pump between the raw milk constant level tank and the raw milk inlet to the regenerator to facilitate flow in HTST pasteurization equipment. For this reason, specifications were developed and incorporated in the 1953 Milk Ordinance and Code *(1)* for the utilization of such an auxiliary pump. These specifications are as follows:

"No pump shall be located between the raw milk inlet to the regenerator and the raw milk supply tank, unless it is so designed and so installed that it can operate only when milk is flowing through the pasteurized milk side of the regenerator, and when the pressure of the pasteurized milk is higher than the maximum pressure produced by the pump. This may be accomplished by wiring the booster pump so that it cannot operate unless *(a)* the metering pump is in operation, *(b)* the flow-diversion valve is in the forward-flow position, and *(c)* a sanitary pressure switch located at the pasteurized milk outlet from the regenerator is so set and sealed as to complete the circuit only when the pasteurized milk pressure exceeds, by at least one pound per square inch, the maximum pressure developed by the booster pump."

Appendix H, Testing of Pasteurization-Plant Equipment, of the 1953 Milk Ordinance and Code, calls for checking by the health officer of the setting of pressure switches "upon installation, monthly thereafter, after any change in the pump or the switch circuit, and whenever the switch seal is broken." It is necessary to make frequent checks, as specified, of the pressure switch cut-in point because the thin diaphragm of the switch can easily be damaged, or ruptured, through careless handling or in cleaning operations. Moreover, short-circuiting of the switch may occur from moisture or other means. When this happens, the operation of the booster pump is uncontrolled and improper relative regenerator pressures will result during certain stages of operation.

DESCRIPTION OF TESTING DEVICE

The pneumatic testing device and procedure herein described affords a convenient and relatively inexpensive way to check pressure switch settings in a short time and with a minimum interference with plant operations. The assembled testing device is

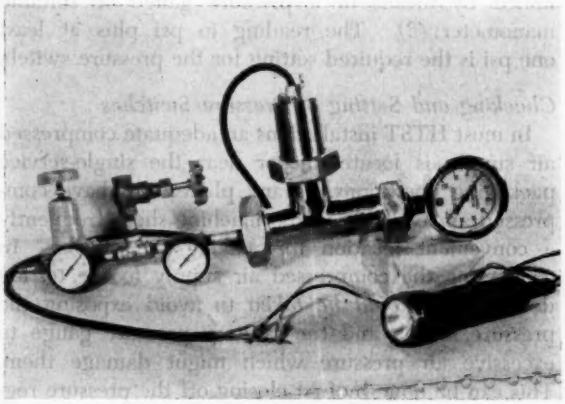

Figure 1

shown in Figure 1. As may be seen, it consists of a 2 in. 7BX tee, with two additional 13H nuts, one of which is provided with a 16A cap drilled and tapped for a 0.5 in. galvanized iron nipple for the air connection. A hose connection is made to a compressed air source in the plant, by means of a snap-on fitting. The air pressure is then controlled by means of a pressure reducing valve (range 0-60 psi), followed by a 0.5 in. globe-type bleeder value, and connected as shown by means of 0.5 in. galvanized iron tees and nipples. Two pressure gauges (range 0-30 psi) with 2½ in. dials are installed, one between the pressure-reducing valve and the connection to the bleeder valve, and the other between this connection and the inlet to the 2 in. sanitary tee. The pressure switch to be tested is disconnected from the HTST pasteurizer and is connected to the side outlet of the sanitary tee, and the leads from a test light or continuity indicator (Muller Electrical Company Bright Star No. 1618 flash light, or equivalent) are clamped to the power plug-cap connections of the electrical cord of the pressure switch. A Vogt sanitary pressure gauge is connected to the other outlet of the sanitary tee.

TESTING PROCEDURE

Determination of Booster Pump Pressure

This determination should be made under operating conditions which will provide the maximum discharge pressure by the booster pump. Operate

the pasteurizer with water, with the flow diversion valve in forward-flow position, the metering pump operating at minimum speed possible, and the booster pump operating at its rated speed. If vacuum equipment is located between the regenerator and the metering pump, it should be by-passed while this determination is being made. The pressure in psi at the discharge of the booster pump may be determined by means of a pressure gauge or suitable manometer *(2)*. The reading in psi plus at least one psi is the required setting for the pressure switch.

Checking and Setting of Pressure Switches

In most HTST installations an adequate compressed air supply is located at or near the single-service packaging operations. Many plants also have compressed air available in the machine shop, frequently a convenient location for making the checks. In connecting the compressed air supply to the testing device *care should be taken* to avoid exposing the pressure switch and the sanitary pressure gauge to excessive air pressure which might damage them. This can be done by first closing off the pressure regulating valve and opening fully the bleeder valve. After the air connection is made, the position of these valves can be changed slowly so as to raise gradually the pressure in the testing device to the desired level. The valves can then be manipulated slowly so as to increase the air pressure to the cut-in point of the pressure switch, which will light the test lamp. (If the switch is short-circuited the lamp will be lighted before air pressure is applied.) This should be about 2 psi or more greater than the maximum pressure of the booster pump, as determined under above. Such a setting will insure compliance with the milk code requirements, as the cut-out pressure in most pressure switches is not more than 0.5 psi lower than the cut-in pressure. The sanitary pressure gauge used in the testing device should be the same as that used for determining the maximum booster pump pressure, or, alternately, the two gauges used should be calibrated against each other in the testing device. Periodic checks against a manometer should also be made.

If the setting is found to be satisfactory, notation should be made under Test No. 21, of the PHS Pasteurization Plant Equipment Tests Form (PHS-723-San.-Rev.4-53), and the pressure switch should be resealed, if, the seal had been broken.

If the setting of the pressure switch is found to be too low, or unsatisfactory, it should be reset as follows: Remove the seal and cap from the switch and loosen the set screw on the adjustment knob. Rotate the adjustment knob as necessary and recheck, by increasing the air pressure, until the test light goes on at or above the required setting. Tighten setscrew and recheck cut-in air pressure, readjusting if necessary until satisfactory results are obtained, replace cover and seal the pressure switch. Test results should be recorded as previously indicated.

Only a few minutes are required to set up, check, adjust, and seal the pressure switch. The cost of the device is less than twenty dollars, exclusive of the sanitary fittings and the Vogt sanitary pressure gauge. The fittings often may be obtained without cost from discarded fittings in processing plants. It is considered preferable for the milk sanitarian to have a Vogt sanitary pressure gauge, which may be calibrated periodically against a mercury manometer. Alternately, any satisfactory sanitary gauge available in the plant may be used. The testing device also may be used for checking one pressure gauge against another.

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A BACTERIOLOGICAL INVESTIGATION OF FROZEN FOODS IN THE OKLAHOMA CITY AREA

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The rapidly increasing amounts of frozen foods of the so-called "heat and eat" variety and other available to the housewife have created possible potential public health hazards. Proper evaluation of such possibilities by health authorities involves the availability of accurate, complete bacteriological laboratory data. Presented in this survey, are the bacteriological results of 192 assorted frozen food samples purchased at the retail level in the Oklahoma City area, and tested during a 17 month period. The question is raised concerning the wisdom of using the coliform group bacteria as indicators of sanitation or contamination. The results tend to point up the need for health authorities to determine a course of action which would best enable them to apply bacteriological standards in order that the consumer may be assured wholesome, high quality products at all times.

Approximately thirty years ago, the public was introduced to a new concept in out-of-season food purchase - quick frozen foods. Almost immediate and enthusiastic acceptance by the public occurred.

In 1939, the industry packed 325 million pounds of frozen foods; in 1959, production reached approximately 6 billion pounds of food products valued at $3 billion. Additional new so-called convenience foods which the housewife needs only to "heat and eat" are constantly being added to the grocer's inventory. These products may be contaminated easily and they are highly perishable. Through faulty handling practices they may become thereby hazardous to public health. Procter *(1)* and Fitzgerald *(2)* in 1947, reported high bacterial counts of ready-to-eat frozen foods and pointed up the hazards. Health officials throughout the nation continue to be hard pressed attempting to keep up with these new ever-increasing products. They recognize a need for some broad overall evaluation as it affects public health, but lack sufficient laboratory information to logically approach the problem.

This study was undertaken *(a)* to determine whether a public health problem exists *(b)* to determine bacterial populations as a helpful guide in establishing reasonable bacterial standards, and *(c)* to supply health officials with additional information from the bacteriological standpoint.

TABLE 1—BACTERIOLOGIAL RESULTS OF FROZEN PRE-COOKED TURKEY PIES.

Source	Date purchased	Total plate count/gm	Coliform count/gm
Brand "A"	Nov 59	190,000	50
	Nov 59	130,000	10
	Feb 60	670,000	0
	Feb 60	320,000	0
	Mar 60	21,000	10
	Mar 60	14,000	0
Brand "B"	Oct 59	1,300,000	0
	Oct 59	150,000	0
	Feb 60	10,000	0[a]
	Feb 60	15,000	0
	Apr 60	520,000	0
	Aug 60	7,500	40
Brand "C"	Nov 59	200,000	0
	Nov 59	2,100,000	330
	Jan 60	5,800	0
	Jan 60	52,000	0
	Nov 60	40,000	0
	Nov 60	35,000	60
Brand "D"	Dec 59	6,400	0
	Dec 59	4,200	0
	Jan 60	29,000	80
	Jan 60	21,000	0
	Apr 60	29,000	50
	Apr 60	54,000	70
Brand "E"	May 60	2,700	10
	Jun 60	500	0
	Jun 60	1,000	20
	Jun 60	2,100	40
	Aug 60	1,600	570
	Aug 60	1,400	0
Brand "F"	Apr 60	34,000	0
	Apr 60	49,000	0
	Sep 60	300,000	130[b]
	Sep 60	500,000	60[c]
	Sep 60	420,000	110[d]
	Sep 60	370,000	180[e]
Brand "G"	Feb 61	45,000	0
	Feb 61	36,000	10
	Feb 61	170,000	10
Brand "H"	Feb 61	85,000	0

[a]Coagulase-positive staphylococci isolated (1,000/gm)
[b]Coagulase-positive staphylococci isolated (11,000/gm)
[c]Coagulase-positive staphylococci isolated (10,000/gm)
[d]Coagulase-positive staphylococci isolated (18,000/gm)
[e]Coagulase-positive staphylococci isolated (11,000/gm)

TABLE 2—BACTERIOLOGICAL RESULTS OF FROZEN PRE-COOKED CHICKEN PIES

Source	Date purchased	Total plate count/gm	Coliform count/gm
Brand "A"	Feb 60	620,000	110
	Feb 60	1,100,000	170
	Mar 60	28,000	0
	Mar 60	1,100,000	30
	Nov 60	22,000	0
	Nov 60	6,800	0
Brand "B"	Feb 60	16,000	10
	Feb 60	17,000	0
	Jul 60	8,400	100
	Jul 60	13,000	60
	Aug 60	190,000	0
	Aug 60	11,000	40
Brand "C"	Oct 59	59,000	80
	Oct 59	17,000	70
	Jul 60	97,000	10
	Jul 60	120,000	10
	Jul 60	29,000	0
	Aug 60	33,000	190
Brand "D"	Dec 59	11,000	10
	Dec 59	7,000	0
	Jan 60	14,000	10
	Jan 60	3,100	30
	Jul 60	3,100	0
	Jul 60	34,000	0
Brand "E"	Jan 60	970	0
	Jan 60	880	0
	May 60	2,900	0
	Jun 60	31,000	0
	Jul 60	3,500	0
	Jul 60	8,500	0
Brand "F"	Apr 60	130,000	0
	Apr 60	45,000	0
	Jan 61	8,500	0
	Jan 61	50,000	20
	Jan 61	75,000	10
	Jan 61	110,000	0
Brand "G"	Oct 59	13,000	0
	Oct 59	23,000	0
	Jul 60	140,000	100
	Jul 60	1,600,000	80
	Aug 60	88,000	0
	Aug 60	290,000	0
Brand "H"	Feb 61	52,000	0
Brand "I"	Nov 60	93,000	10
	Nov 60	61,000	250

METHODS AND RESULTS

Funds for this study were furnished by the Research Grants Committee of the Oklahoma Public Health Association and were used solely for the purchase of the frozen foods at the retail level. Work began on October 1959, and continued until available funds were exhausted in March 1961. A total of 192 samples were purchased and tested. Not more than 12 samples were purchased at any one time, and not more than 6 were tested in any one week period during the entire 17 month period of the project.

All samples were transported to the laboratory in an insulated carrying case containing dry ice. In the laboratory, they were immediately placed in the deep freeze and kept at a temperature of -25°C until tested. Before testing, the samples were thawed at room temperature, and 50 grams were removed aseptically into a sterile Waring blendor jar containing 450 ml of sterile buffered distilled water and blended for 2 minutes. From this 1:10 dilution, further dilutions of 1:100, 1:1,000, 1:10,000 and 1:100,000 were made.

Standard plate counts were made of the above dilutions using a milk protein hydrolysate agar medium and an incubation period of 48 hrs ± 3 at 35°C.

For the coliform determinations *(3)*, violet red bile agar was used and the plates incubated 18-24 hours at 35°C. All coliforms were confirmed as coliforms

TABLE 3—BACTERIOLOGICAL RESULTS OF FROZEN PRE-COOKED BEEF PIES.

Source	Date purchased	Total plate count/gm	Coliform count/gm
Brand "A"	Mar 60	47,000	0
	Mar 60	240,000	400
	Mar 60	94,000	1,900
	Mar 60	66,000	420
	Mar 60	1,400,000	260
	Mar 60	110,000	0
Brand "B"	Oct 59	500,000	400
	Oct 59	72,000	2,400
	Apr 60	500	0
	Apr 60	280,000	760
	Aug 60	6,900	40
	Aug 60	80,000	0
Brand "C"	Oct 59	21,000	10
	Oct 59	5,800,000	260,000
	Jul 60	44,000	10
	Jul 60	68,000	0
	Jul 60	370	0
	Nov 60	1,300	0
Brand "D"	Dec 59	17,000	0
	Dec 59	5,400	10
	Apr 60	7,000	0
	Apr 60	4,900	0
	Jul 60	6,500	170
	Jul 60	3,300	10
Brand "E"	Jan 60	2,800	0
	Jan 60	1,500	0
	May 60	300	0
	May 60	860	0
	Aug 60	430	0
	Aug 60	1,600	130
Brand "F"	Sep 60	18,000	0
	Sep 60	2,100	0
	Sep 60	24,000	0
	Sep 60	31,000	0
	Jan 61	4,300	0
	Jan 61	12,000	10
Brand "G"	Feb 61	5,700	0
	Feb 61	9,200	20
Brand "H"	Feb 61	2,200	80

by inoculation of resulting colonies into a 2% brilliant green lactose bile broth. This was done to eliminate the possibility of false positive coliform counts due to the presence of sucrose and/or other substances present in the frozen food product which might be carried over into the dilutions in sufficient amounts for bacteria other than coliforms to act biochemically as coliforms.

Mannitol salt agar plates, incubated for 48 hours at 35°C, were used to determine the presence of possible food-poisoning staphylococci, and if found, the usual coagulase tests were performed. Blood agar plates were used to determine the presence of beta hemolytic organisms.

The search for species of *Salmonella* was conducted using an enrichment medium of selenite broth followed by transfer to SS agar. All suspicious colonies found on this medium were transferred to TSI agar tubes and the usual biochemical procedures followed to determine their presence or absence as well as that of other enteric pathogens.

The tested products consisted of all available brands (including nationally-known brands) from as many different retail establishments as it was possible to visit in the Oklahoma City area. Initially, the main effort was directed toward obtaining a significant number of beef, and poultry pot pies; later, selection of samples became more varied in order that a rather general bacteriological picture could be obtained of most frozen food products which would be of interest to the health official. An attempt also was made to divide the purchasing of samples equally among the fall, winter, spring and summer in order to determine the effect, if any, of the extremes of weather on the bacteriologic populations of frozen foods.

A total of 192 samples were examined. Of this number, 135 consisted of turkey, chicken, and beef pot pies and the so-called TV dinners involving 9 brands of approximately 6 samples each.

TABLE 4—BACTERIOLOGICAL RESULTS OF FROZEN TV DINNERS.

Source	Date purchased	Total plate count/gm	Coliform count/gm
Brand "A"			
(turkey)	Feb 60	3,000	0
	Feb 60	10,000	10
(chicken)	Feb 60	17,000,000	90
	Feb 60	1,700,000	150
(beef)	Feb 60	8,100	0
	Feb 60	11,000	0
Brand "C"			
(beef)	Nov 59	12,000	10
	Nov 59	2,100	0
	Nov 59	9,500	61
	Nov 59	13,000	40
(turkey)	Apr 60	7,900	0

TABLE 5—BACTERIOLOGICAL RESULTS OF FROZEN SEA FOODS.

Product	Date purchased	Total plate count/gm	Coliform count/gm
Halibut steaks	Nov 59	7,600	0
	Nov 59	6,200	20
Sole fillets	Mar 61	9,400	0
Ocean perch	Mar 61	550,000	0
Fillet of cod	Feb 61	12,000	0
Haddock	Nov 60	13,000,000	0
(french-fried)	Feb 61	194,000	30
	Mar 61	51,000	10
Catfish sticks	Nov 59	88,000	0
	Nov 59	96,000	0
Fish sticks	Jan 61	270,000	0
	Feb 61	6,900	0
	Feb 61	4,300	0
	Mar 61	6,000	0
	Mar 61	27,000	0
	Mar 61	38,000	0
Shrimp creole	Jan 61	390,000	0
Fish cakes	Feb 61	6,800	0
	Feb 61	1,800	0
Tuna pie	Jan 61	240	0
	Jan 61	400	0
Breaded shrimp	Mar 61	290,000	0
Stuffed shrimp	Jan 61	2,300,000	70
	Jan 61	5,400,000	500
Crab sticks	Jan 61	23,000	30
	Jan 61	140,000	190
Lobster newburg	Feb 61	34,000	0
	Mar 61	18,000	0
Breaded oysters	Feb 61	110,000	290
	Feb 61	100,000	10
	Feb 61	85,000	160
Scallops	Nov 60	800	0
	Feb 61	2,000	0
	Mar 61	190,000	0
	Mar 61	510	0
Crab meat	Jan 61	1,200	0
Crab legs	Mar 61	620	0
Deviled	Nov 60	430,000	0
crabcakes	Feb 61	35,000	20

Table 1 shows the total bacteria counts and coliform counts for turkey pies of all brands tested. Fourteen or 35% of the 40 samples had total plate counts of over 100,000 per gram. If the standard of less than 10 coliforms is used as required by the Quartermaster Food and Container Institute, 19 or 47% did not meet these requirements. Brands "D" and "E" had total counts well below the 100,000 level and indicated that some of the manufacturers have no difficulty meeting this requirement.

One sample of brand "B" showed 1,000 coagulase-positive staphylococci per gm and 4 of the 6 samples of brand "F" had coagulase-positive staphylococcal counts ranging from 10,000 to 18,000 per gram. Products such as these are potentially hazardous.

Table 2 lists the results of tests on 45 chicken pies; 10 or 22% exceeded 100,000 per gram and 21 or 46% of the pies had 10 or more coliforms per gram.

TABLE 6—BACTERIOLOGICAL RESULTS OF FROZEN MISCELLANEOUS FOODS.

Product	Date purchased	Total plate count/gm	Coliform count/gm
Pig in blanket	Oct 59	36,000	0
	Oct 59	52,000	0
Meat loaf	Jan 60	1,300,000	430
Beef steaks	Jan 60	1,800,000	1,300*
	Jan 61	680,000	0
Roast beef hash	Feb 61	1,300	0
	Mar 61	5,000	0
Spaghetti dinner	Aug 60	850,000	0
	Aug 60	490,000	0
	Jan 61	40	0
Hot tamales	Jan 61	70	0
Sausage pizza	Jan 61	17,800,000	0
Chicken chow mein	Jan 61	1,500	0
Creamed chicken & biscuits	Jan 60	690	0
Tenderoni & beef in tomato sauce	Jan 60	40,000	0
Macaroni & cheese casserole	Jan 61	760	0
Spaghetti & meat sauce	Jan 61	790	0
Escalloped chicken & noodles	Feb 61	360	0

*Coagulase-positive staphylococci isolated (12,000 col. per gram)

Table 3 lists 39 beef pie samples of which only 6 or 15% exceeded 100,000 per gram; however, 18 or 46% had coliform counts of 10 or more per gram.

Eleven so-called TV dinners listed in table 4 consisted of two brands. Two chicken dinners purchased in Februray 1960 showed total counts of 1,700,000 and 17,000,000.

Thirty-nine assorted sea foods consisting of 10 brands were also examined and the results are listed in Table 5. Thirty-three percent exceeded a total plate count of 100,000 per gram, while 28% did not meet the coliform requirement.

In Table 6 are listed 18 samples consisting of 9 brands of assorted miscellaneous foods.

DISCUSSION

Fifty of the 192 samples or 26% had total plate counts exceeding 100,000 per gram. One of the samples (sausage pizza pie) presented an interesting observation. It is a well-known fact that starter cultures are used in cheese manufacture, also, one or more types of cheese are normal ingredients in most frozen pizza pies. These cheese usually are placed on top of the pies last and then the pies are frozen. Any laboratory examination of such a product would normally include portions of such cheese in the natural, unmelted state. High total counts would be expected. To verify this, a package of cheese sold primarily for use with pizza pies was purchased and tested. The total viable bacteria count was 120,000,000 per gram. Obviously, pizza pies manufactured in this manner should not and cannot be included with those products for which total bacterial standards apply.

No doubt there are other ingredients in frozen food products which reach the consumer in the raw state, and therefore, should be taken into consideration when determining bacterial populations and applying standards. However, this study does show that the suggested maximum level of 100,000 per gram is more than a reasonable standard as evidenced by many manufacturers having no difficulty producing such products with total plate counts far below this level.

Six of the samples examined showed the presence of coagulase-positive staphylococci with counts ranging from 1,000 to 18,000 per gram. There were no species of *Salmonella* or other enteric pathogens isolated from any of the 192 samples.

The Quartermaster Food and Container Institute standard of less than 10 coliforms per gram brings up the wisdom of using the coliform group bacteria as indicators of sanitation or contamination. Approximately 40% of the samples in this study would not have been able to meet these requirements.

Kereluk and Anderson *(4)*, in a study on the bacteriological quality of frozen meat pies, showed that the predominant source of coliforms was of non-fecal origin and that these coliforms were identified as members of the genus *Aerobacter*.

All of the pot pies studied in this project had pie shells made of raw dough. Obviously this dough could contain bacteria of the coliform group not necessarily associated with a fecal source. Hartman *(5)*, in a study of coliforms in frozen food products, recently stated, "Until non-fecal coliforms are shown to indicate contamination from a "dangerous source" there is no reason to believe that these types of coliform bacteria, just because they form a colony on violet red bile agar, should be considered any less desirable in pot pies than other innocuous micro-organisms." Other workers have commented on some of the inadequate aspects of using coliforms as indicators of pollution.

It would appear that the presence of coliform organisms not of fecal origin does not necessarily indicate that the foods were cooked insufficiently or that they were contaminated after cooking or during processing prior to freezing. As previously mentioned, these coliforms may be only natural inhabitants of the various ingredients used in the manufacture of the frozen food products. The entire coli-

form problem relating to frozen foods may need to be re-studied and re-evaluated. Certainly, it would appear, that to set standards of so many coliforms per gram, would necessitate proof of their fecal origin or of their originating from some other source considered "dangerous."

No significant trend in bacterial population was associated with any of the spring, summer, fall or winter seasons.

References

1. Procter, B. S., Phillips, A. W. Refrig. Eng. **53**: (1):30. 1947.
2. Fitzgerald, G. A., Food Industry. **19**:507-508. 1947.
3. Am. Pub. Health Assoc. *Recommended Methods for the Microbiological Examination of Foods*, p. 134, 1958.
4. Kereluk, K., Gunderson, M. F. Studies on the bacteriological quality of frozen meat pies. J. Milk and Food Technol. **22**:176. 1959.
5. Hartman, P. A., Further Studies on the selectivity of violet red bile agar. J. Milk and Food Technol., **23**:45. 1960.

NEWS AND EVENTS

ADSA COMMITTEE TO ADVISE DSI ON TECHNICAL MATTERS

Dr. R. F. Holland of Cornell University was named Chairman of a newly formed American Dairy Science Association Advisory Committee to Dairy Society International, it was announced by Dr. E. L. Jack, ADSA President and George W. Weigold, DSI's Managing Director.

A wide range of technical questions come to the Society from its members in some 45 countries, in its capacity as the official Cooperator with the Foreign Agricultural Service (USDA) in market development programs under Public Law 480, as the industry focal point for dairy-industry-interested visitors to the United States and as a result of its liaison and consultative status with United Nations agencies such as the Food and Agriculture Organization and UNICEF. The Committee has been established by ADSA, as a public service, to make available in answer to these queries the latest scientific data concerning a wide range of dairy techniques. The Committee also will advise on selection of personnel for overseas assignments and on programs for overseas trainees and dairy visitors.

In asking the ADSA Executive Board to establish such a Committee, Mr. Weigold said: "We believe that such a close association not only would greatly strengthen and enrich the Socitey's technical assistance program, but would give the rest of the world a chance to savor the competence and depth of knowledge of the U. S. scientific community."

"The Executive Board", Dr. Jack said, "feels that ADSA has a professional responsibility to assist in advancing international dairy relations and I hope that this cooperation will prove to be one effective way to meet this responsibility."

Other members of the Committee are: Dr. A. O. Shaw, Dairy Science Department, Washington State College, Pullman, Washington; Dr. H. E. Calbert, Dairy and Food Industries, University of Wisconsin, Madison, Wisconsin; Dr. Dwight Seath, Dairy Section, University of Kentucky, Lexington, Kentucky; Dr. C. D. McGrew, Dairy Science Department, Ohio State University, Columbus, Ohio; and Dr. Fred Babel, Dairy Department, Purdue University, Lafayette, Indiana.

MARYLAND DAIRY TECHNOLOGY COURSES SCHEDULED

A number of dairy technology courses and conferences will be held on the following dates under the sponsorship of the Dairy Department, University of Maryland.

November 8, 1961 - Dairy Technology Conference, Continental Hotel, Washington, D. C.

January 22-31, 1962 - Ice Cream Short Course, Dairy Department of the University.

February 1, 1962 - Ice Cream Conference, Student Union Building at the University.

March 14, 1962 - Cottage Cheese Conference, Student Union Building, at the University.

Those desiring additional information should communicate with Professor Wendell S. Arbuckle of the Dairy Department, College Park, Md.

BOSSY GETS WASHED ALL OVER WITH NEW DEVICE

The "COWASH," invented and manufactured by Teo Albers of Artesia, California, is fully automatic and somewhat resembles the familiar 5-minute car wash. Cows are herded into one end of a chute, each turns on and off her own supply of water and as they walk out the opposite end, they are clean and ready for milking.

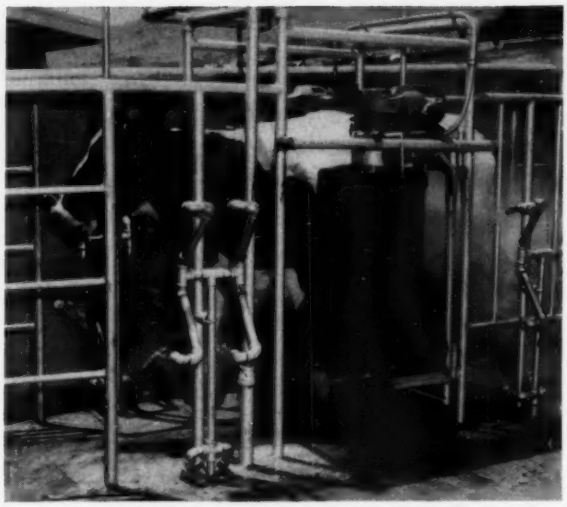
The "COWASH" consists of two units, (see picture) both similar in design and each equipped with

24 water spray nozzles mounted in banks of 12 each. Each bank is controlled by a spring-loaded valve which is activated by the cows themselves. The second unit pictured has in addition 2 rotating vertical-contoured soft fiber brushes.

In operation, as a cow enters the first unit her body triggers the valve of the first bank of spray jets. This thoroughly soaks the cow on the legs, sides, belly and rear – yet, at all times her head remains dry. This is again repeated as the cow triggers the second set of jets in the soaking unit.

The second unit is installed approximately 100-200 feet away. This distance allows ample time for soaking and dripping while passing between the two units. In the second unit the cow again triggers the two banks of spray jets, here the cow is washed, scrubbed by the contoured brushes and then thoroughly rinsed ready for milking in the average time of 4½ seconds per cow.

Cows enter chute where they are sprayed and soaked.



Following the chute, cow enters second unit and is washed with two rotating vertical contoured soft fiber brushes.

EMERGENCY FOOD RATION PROPOSED FOR SHELTER AREAS

A surge in citizen interest resulting from increasing world tensions has prompted General Mills to make available its emergency food, MPF (Multi-Purpose Food) to American dairies for route distribution to homes wishing to stock home shelter areas.

Civil Defense authorities have recommended that everyone have a two-weeks food supply in his home shelter area – and a three-day survival kit in his automobile in case evacuation is necessary. MPF, it is stated provides a simple way to comply with these recommendations and to insure adequate nutritional protection during short periods of emergency.

Each 4½ pound can of MPF provides enough food for one person for two weeks. MPF is hermetically sealed in cans made of special corrosion resistant tin plate to assure a minimum shelf life of five years.

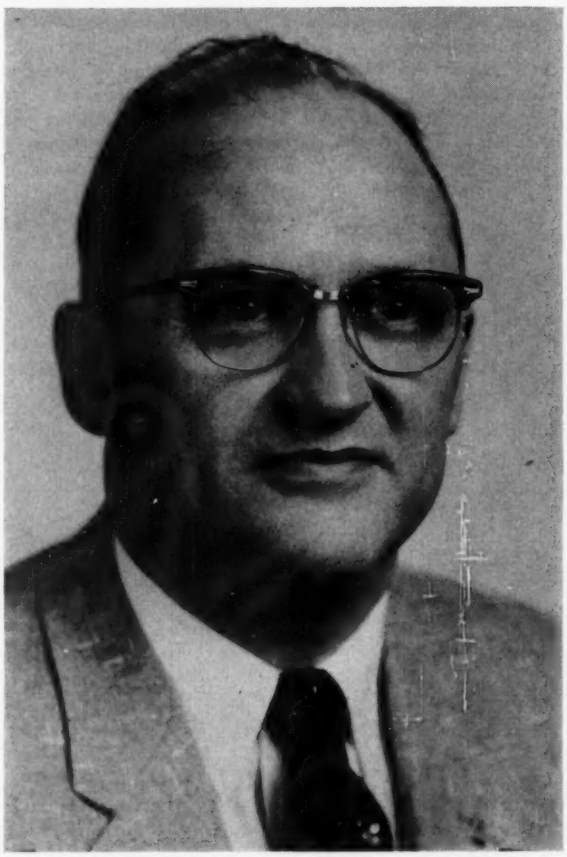
The product consists of protein-rich granules combined in a scientific blend with 12 essential vitamins and minerals. Made exclusively by General Mills under a licensing agreement with the non-profit Meals for Millions Foundation, MPF has been praised in Congressional hearings, has received enthusiastic endorsement from the office of Civil and Defense Mobilization and has been recommended for use as a survival food by the Army Quartermas-

ter General. Already it has played an important part in Civil Defense Adult Education programs in many states, including Kentucky, Texas, Minnesota and California; other states initiating civil defense classes are including MPF in their programs.

Army and Navy planes have air-lifted shipments of MPF into disaster-stricken areas in Africa, the Far East and the Middle East, and large commercial and industrial firms have begun to stock shelter areas with this life-sustaining food.

GEORGE H. STEELE HONORED

The annual Sanitarian's Award given by the Minnesota Association of Sanitarians was awarded to George H. Steele, Assistant Director of Agricultural Products Inspection of the State Department of Agriculture. Steele was cited for his years of dedicated public service, for his industry in helping to develop the Grade A milk program in the State and for his service to the Minnesota Association in which he served for nearly a decade as Secretary Treasurer.



George H. Steele of Minnesota.

Mr. Steele is a graduate of the University of Minnesota and holds an M. S. degree from that institution in Dairy Husbandry and Chemistry. The award was made at the Association's annual banquet September 14 at Minneapolis.

NINTH CORNELL DAIRY INDUSTRY CONFERENCE PRESENTS FINE PROGRAM

More than 600 representatives of the dairy industry from New York and nearby states met in Albany September 25-27 in a joint conference aimed toward making the latest scientific information available to dairy specialists.

The Cornell Dairy Industry Conference, held jointly with a conference of the *New York State Association of Milk Sanitarians* gave dairy equipment manufacturers, processers, fieldmen, laboratory personnel, and health department officials a look at the latest findings in their fields.

The Cornell meeting is sponsored by the New York State College of Agriculture. The conference was the ninth held jointly by the two groups.

Papers were presented on equipment, sanitation. ways of improving production, and milk marketing.

Panel discussions were held on qualifications and problems of fieldmen, farm inspection, bulk milk coolers, and bulk milk tanks.

Featured speakers included Herman E. Hilleboe, Commissioner of the New York State Department of Health; Ira A. Gould, Department of Dairy Technology, Ohio State University; G. M. Trout, Department of Food Science, Michigan State University; H. V. Atherton, Department of Animal and Dairy Husbandry, University of Vermont; and Gerald Silverman, Department of Nutrition, Food Science and Technology, M.I.T.

Cornell speakers from the Department of Dairy and Food Science included Profs. B. L. Herrington, A. C. Dahlberg, J. C. White, L. E. Bond, W. F. Shipe, and R. P. March. Also from Cornell: Profs. L. C. Spencer, agricultural economics; G. H. Schmidt, animal husbandry; and H. C. Temple, veterinary college.

MINUTES OF THE ANNUAL MEETING OF THE COUNCIL OF AFFILIATES, 1961

The meeting convened with a dinner at 6:00 p.m., August 15, 1961. The business session was called to order by Dr. R. M. Parry at 6:50 p.m. The Executive Board attended the Council meeting by a request vote of the Council. Each person present made his own introduction.

The Minutes of the 1960 Council meeting were approved

as corrected. The one correction was to list Everett Lobb as the delegate from North Dakota and not from South Dakota. South Dakota was not represented at the meeting in 1960. Dr. Parry passed out a list of ten questions for the Agenda and they were discussed as follows:

1. Long-range viewpoints of the Affiliate Council.

This topic resulted in a discussion of how to improve membership in IAMFS. President Sheuring said that the International dues were increased to help pay for an assistant to the executive secretary. This assistant would help with a membership drive. Mr. H. L. Thomasson has 1200 extra copies of the August 1961 Journal and many back numbers of the Journal which are available to use for membership recruitment. It was suggested that a membership recruitment letter be prepared and also a brochure which would tell all the benefits of belonging to the International.

Continuity in Council membership is desirable. The official delegate to the Council meeting should be the Secretary-Treasurer whenever possible. The Constitution requires this. However, an alternate can be selected whenever necessary, but the Council strongly recommends that each Affiliate pay the secretary's expenses to the Council meetings.

Another topic requested for consideration was to have the International make recommendations concerning the registration of sanitarians and also suggest how to compete with the National Association of Sanitarians.

2. How can a closer liaison be established between the Council members and the Executive Board.

It was suggested that the Executive Board should keep the Council members informed of their current activities. It was suggested that a summary of Executive Board meetings be published in the Journal or sent directly to each Council delegate. Some preferred both, but the majority preferred the latter suggestion.

3. What happens to recommendations on committee reports?

The discussion of this topic indicated that there is room for improvement in this area. In particular there is considerable room for improvement in the way committee reports are written and presented. If recommendations are in order, they should be stated definitely at the end of the report so that action can be taken concerning the recommendations.

4. Future plans for the Journal.

President Sheuring indicated that there are plans to improve the Journal when they can obtain more manpower as a result of finding an assistant to the executive secretary. Dr. Olson pointed out the importance of publishing original scientific papers in the Journal to maintain the high prestige the Journal now enjoys. He pointed out that one of the deficiencies is lack of coverage of Association affairs and made a plea to the delegates to do a better job of reporting to him the activities of each Affiliate.

5. Discussion of the Milk Sanitation Act and the IAMFS position.

Not discussed.

6. What can be done to get all Affiliates to have representatives present?

This was discussed when topic No. 1 was considered, namely, that Affiliates should pay the secretary-treasurer's expenses as official delegate each year.

7. Special identification for representatives of the Affiliates.

This was tried this year for the first time. Affiliates wore an identifying red badge. This idea was very successful and it is strongly recommended that it be repeated in the succeeding years.

8. Can a speakers list of specialized subjects be prepared?

Ideas for speakers can come from topics used by Affiliates at their local meetings. Last year 14 of the Affiliate programs were published in the Journal. It is requested that delegates continue to send this information to Dr. Olson.

9. Other items of interest.

It was requested that we have a change in the By-laws to provide for a better system of election of officers to the International. After considerable discussion, Mr. Edmondson moved that a resolution be prepared by Mr. Meany to recommend to the Executive Board that a better system of election of officers be studied. Motion seconded and passed. This resolution was to be presented at the 1961 Business Meeting.

Dr. Parry was re-elected as Chairman of the Council and R. P. March was elected secretary. This was by means of a motion by Mr. L. W. Brown, seconded and passed. Dr. Parry accepted the chairmanship with the understanding that a chairman should serve for only two years. Dr. Parry is planning to resign in 1962.

The meeting adjourned at 10:00 p.m.

R. P. MARCH, *Secretary*

MEMBERS PRESENT

Name	*State*	*Position*
R. M. Parry	Connecticut	President (delegate)
I. E. Parkin	Pennsylvania	Advisor (delegate)
W. S. LaGrange	Kentucky	Sec.-Treas.
J. E. Edmondson	Missouri	Sec.-Treas.
R. B. Wehmer	Missouri	President
G. S. Kennedy	Virginia	Secretary
J. R. Pattillo	Virginia	President
J. J. Sheuring	Georgia	Sec.-Treas.
F. W. Barber	New York	Executive Board
W. V. Hickey	New York	Executive Board
A. A. Roth	Michigan	President
L. W. Sheumaker	Florida	President
P. E. Riley	Illinois	Guest
H. S. Adams	Indiana	Delegate
K. K. Jones	Indiana	Executive Board
F. L. Kelley	Kansas	Sec.-Treas.
R. A. Belknap	Iowa	Executive Board
F. C. Baselt	New York	Guest
J. C. Olson, Jr.	Minnesota	Editor
H. L. Thomasson	Indiana	Executive Board
Peter Hanson	Minnesota	President
R. L. Sanders	Iowa	Delegate
J. L. Barnhart	Idaho	President (delegate)
W. R. Knutzen	Washington	Delegate
Everett Lobb	North Dakota	Sec.-Treas.
L. W. Brown	Wisconsin	Sec.-Treas.
J. S. Meaney	Illinois	Sec.-Treas.
J. H. Fritz	Washington, D. C.	Executive Board
R. P. March	New York	Sec.-Treas. (delegate)
C. E. Walton	Rocky Mt. Assn.	Executive Board

PAPERS PRESENTED AT AFFILIATE ASSOCIATION MEETINGS

Editorial Notes: The following is a listing of subjects presented at recent meetings of Affiliate Associations. Copies of papers presented may be available through the Secretary of the respective Affiliate Association.

Rhode Island Association of Dairy and Food Sanitarians

North Providence, R. I.
October 18, 1961
(*Secretary*: Sidney Shepard, Box 22, Warwick, Rhode Island)

The Controversy Over Fats in the Diet and Its Effect on the Dairy Industry - Robert W. Shafer, Regional Mgr., National Dairy Council.

The United States Public Health Service Program - Archie B. Freeman, Sanitary Engineer Director, U. S. Public Health Service.

California Association of Dairy and Milk Sanitarian Conference

Sacramento, California
October 9-10, 1961
(*Secretary*: Robert J. Beard, 7301 Cardinal Road, Fair Oaks, California)

Laboratory Procedures - Miss Marian Tarbell, Lab. Dir., Sacramento Health Dept.

Some Viewpoints on Mastitis and Its Control - Henz Kraus, Diablo Laboratories, Berkeley.

H.T.S.T. Vacuum Treatment of Milk and Milk Products - Demonstration - Walt Ross, DeLaval Separator Co., Millbrae.

Public Relations - Mario F. Conforti, Management Development Director, Permanente Services, Oakland.

Panel Discussion - Vernon W. Moist, Los Angeles City Health Dept., *Moderator*.

Increased Use of Plastic Surfacing in Dairy Barns, Milk Houses and Milk Plants - Robert Gaede, Laede Cement Resurfacing Co., Fresno.

Corrals: (Feeding and Holding) Planning, Construction and Maintenance as an Aid to Cow Cleaning and Clean Milk - Rogers Carter, Dairy Inspector, Los Angeles City and Kings County Health Depts.

Developments in the Pre-Fabrication of Dairy Buildings - P. J. Dolan, Specialist in Milk and Milk Products, Bureau of Dairy Service, Sacramento.

Problems of Farm Tank Calibration and Measuring Devises. Use of Dual Guage Rods on Large Tanks - Burrus G. Wood, Ass't. Chief, Bureau of Weights and Measures, Sacramento; W. F. Langguth, Deputy County Sealor of Weights and Measures, Tulare County.

The Dairy Producer's Viewpoint of Dairy Inspection - Wesley N. Sawyer, Vice-Pres., California Milk Producers Federation.

Use of Plastics in the Conveyance of Milk and Milk Products - U. S. Stoneware Co., Akron, Ohio.

Nation Wide Look at the Dairy Industry - Harold Huebsch, Vitafreze Equipment Co., Sacramento.

The Program of the Agricultural Education Department, as Related to the Dairy Industry - E. D. Graf, Ass't Chief, Bureau of Agricultural Education, Sacramento.

Mobile Dock Plants - Richard Ayres, Los Angeles County Health Dept.

Central Ontario Milk Sanitarians Association

Ontario Agricultural College
Toronto, Ontario, Canada
September 13, 1961
(*Secretary*: Wm. D. McCorquodale, 409 Huron St., Toronto, Ont., Canada.)

California Mastitis Test - Fred Roughley, Dept. of Health, Barrie, Ont.

The Value of Teat Dipping for Mastitis Control - Dr. Newbold, Ontario Veterinary College.

Milk Composition Survey - D. Beggs, Ass't. Professor, Ontario Agricultural College.

HELPFUL INFORMATION

Editorial Note: Listed below are sources of information on a variety of subjects. Requests for any of the material listed should be sent by letter or postcard to the source indicated.

Appraisal of Methods for Assessing the Sanitary Quality of Milk. Information Div., Canada Dept. Agric., Ottawa, Ontario, Can.

Pure Food & Pure Food Legislation. A. J. Amos. Butterworth, Inc., 7235 Wisconsin Ave., Washington 14, D. C. 167 pages. $4.00.

Aerosol Science & Technology. H. R. Shepherd, Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1960. $22.50.

An Introduction to the Thermal Processing of Foods. S. A. Goldblith et. al. AVI Publishing Co., P. O. Box 388, Westport, Conn. 128 pages.

Safe Drinking Water in Emergencies. U. S. Gov't. Printing Office, Washington, D. C. 5c.

Fly Control on Dairy Farms. L. K. Cutkomp. Dept. Entomiology & Economic Zoology, Univ. Of Minnesota, St. Paul. County Agent Vo-Ag Teacher 17, No. 6, 16 pages. June 1961.

A 1960 Survey of Mastitis in the Lansing Milk Shed. Mich Agric'l. Expt. Sta. Quart. Bul. 43 (3) 502-507. Feb. 1961. Mich. State Univ. E. Lansing, Mich. 50c.

Relative Cleanability of Stainless Steel Tubing & Milk Dispenser Cans Having Various Finishes. Mich. Agric'l. Expt. Sta. Quart. Bul 43 (3) 508-517. Feb. 1961. Mich. State Univ., East Lansing, Mich. 50c.

Manual of Septic Tank Practice. Supt. of Documents, Washington, D. C. 40c.

Water Use in the United States. Supt. of Documents, Washington, D. C. 5c.

Science & Technology of Food Preservation by Ionizing Radiations. Chemical Pub. Co., 212 Fifth Ave., New York 10, N. Y. 192 pages. $4.50.

Food Yields Summarized by Different Stages of Preparation. Agric'l. Handbook No. 102. 93 pages. Supt. of Documents, Washington, D. C. 50c.

Bibliography on Fatty Acids in Foods & Other Commodities. 1920-1949. 104 pages. Human Nutrition Res. Branch, Agric. Res. Service, U. S. Dept. Agric., Washington 25, D. C. Free.

Survey of Distribution Practices for Prepackaged Frozen Meat. 1956. 23 pages. Catalog No. A 1.82:137. Supt. of Documents, Washington, D. C. 20c.

U. S. Grades for Beef. Revised 1956. 6 pages. Catalog No. A 1.35:310/3. Supt. of Documents, Washington, D. C. 5c.

GEORGIA SOCIETY OF SANITARIANS PRESENTS AWARDS AT ANNUAL MEETING

Dr. S. C. Rutland, State Health Department, Atlanta, presenting plaque and certificate to Roland Roberts of the Fulton County Health Department who was selected as the outstanding food sanitarian for 1961. Mr. John Bradley, (right) President of the Georgia Restaurant Association presented the award winner a check in the amount of $50.00.

Mr. Frank Golden, Chairman of the Committee on Recognition and Awards presenting a plaque to James R. Gresham, Macon, Georgia, who was selected by the Georgia Society of Sanitarians as the outstanding milk sanitarian for 1961. On the right is Raymond Summerlin, President of the Georgia Society.

A check in the amount of $50.00 was given by Sealtest Foods of Atlanta to the award winner.

USDA APPROVES TOTE BINS FOR POWDERED MILK

Milk producers bidding for government contracts for powdered milk for use in school milk programs and foreign aid now may use Tote Bins for the handling of the dry milk, thanks to an amendment (Announcement LD-32, Amendment No. 1 of 6/19/61) in specifications of the Department of Agriculture's Agricultural Stabilization Conservation Service. Until the change was made, the majority of milk producers were packing government-specification milk powders in 55-gallon drums with polyethylene liners.

In announcing the amendment at Tote's Beatrice, Nebraska headquarters, Tote System officials said that "while lined drums undoubtedly will continue to be widely used in the program," the Tote System is expected to make "very rapid inroads" into the dry milk handling picture, since the Bins can easily receive the powders directly from spray dryers; reduce manpower requirements for dumping; provide overall cleanliness and save liner and bag costs while effecting a plant space savings. The Tote System has long been used for handling of all but government-ordered milk powders for both domestic and foreign markets.

Sani-Matic

STAINLESS STEEL

TOTE CAN

Strong Cover Lock Bail
Umbrella Cover
Double Base Bail Hinge
Cover Hanger with Finger Grip
Seamless, Polished Container
Open Sanitary Top Edge (No Solder)
Large Radius Corners
Double Bottom & Protecting Chime

Sani-Matic Tote Can—as all Sani-Matic Equipment—offers the best in sanitation and convenience at prices all milk producers can afford.

THE SCHLUETER CO.
EQUIPMENT DESIGNED WITH YOUR FUTURE IN MIND
JANESVILLE, WIS. PL 4-3358

ANNOUNCEMENT OF REGULAR CORPS EXAMINATION FOR SANITARIANS UNITED STATES PUBLIC HEALTH SERVICE COMMISSIONED CORPS

Competitive examinations for appointment of Sanitarians as officers in the Regular Corps of the United States Public Health Service Commissioned Corps will be held throughout the United States on February 13, 14, and 15, 1962.

Appointments provide opportunities for career service in environmental sanitation activities, including research, in the PHS officer grades of Assistant, and Senior Assistant Sanitarian, equivalent to Navy ranks of Lieutenant (j.g.) and Lieutenant, respectively.

Entrance pay for an Assistant Sanitarian with dependents is $4,817; for a Senior Assistant Sanitarian with dependents, $6,270. *Promotions* are made at rapid intervals.

Benefits include periodic in-grade pay increases, 30 days annual leave with pay, sick leave with pay, full medical care, disability retirement pay, regular retirement pay (based on three-fourths of annual basic pay at time of retirement), and many other privileges.

Active duty as a Public Health Service officer fulfills the Selective Service obligation for military duty.

Requirements include United States citizenship and (a) a Master's degree in sanitary science, sanitary science and public health, or equivalent; or (b) an undergraduate degree with 50 semester or equivalent hours in the biological and physical sciences; plus a Master's degree in public health, or a Master's degree with major study in the biological and physical sciences, and in addition two years of creditable experience in the practice of environmental sanitation. For the Assistant Sanitarian grade, applicants must have at least three post-graduate years of professional training and experience (bringing total training and experience to a minimum of seven years). For the Senior Assistant Sanitarian, an applicant must meet the requirements for the Assistant grade and must have at least six post-graduate years of professional training and experience (bringing total to no less than ten years). For appointment to the Assistant grade, candidates must be under 34 years of age; and for the Senior Assistant grade, under 37.

Entrance examinations will include an interview, physical examination, and comprehensive objective examinations in the appropriate professional fields.

Application forms may be obtained by writing to the Surgeon General, United States Public Health Service (P), Washington 25, D. C. Completed application forms must be received no later than January 5, 1962.

What you can do to help prevent mastitis

Iosan with "Tamed Iodine" discovery, kills mastitis organisms. Completely safe, it is used freely on sensitive udders and teats

Now you can be taking more effective steps against an outbreak—or spread—of mastitis. With no greater effort. And at no greater cost.

Iosan, with "Tamed Iodine," destroys mastitis organisms. It is the most powerful germicide known to science. Yet it will not chap hands, and is specially formulated for the most sensitive udders and teats. Merely apply with disposable Lazarus Roll Cow Towels.

Cleans equipment, even removes milkstone

Because Iosan also contains a powerful detergent, it is also used to clean milking equipment, bulk tanks and utensils.

It even removes milkstone. Normal deposits wash away. Heavy accumulations are quickly spotted – Iosan turns them a yellow-brown—and easily removed.

Water hardness no problem

Iosan dilutes in cool or lukewarm water. (Producers with large herds enjoy savings in hot water bills alone.) And Iosan's action is not adversely affected by hard water.

Tens of thousands of dairy producers in the U.S. and Canada enjoy maximum security against mastitis with Iosan. Do you?

For information on Iosan and Roll Cow Towels, contact your local supplier or Lazarus Laboratories, Inc., Division of West Chemical Products, Inc., 42-16 West Street, Long Island City 1, New York.

"Iosan" and "Tamed Iodine" are Registered Trade Marks of West Chemical Products, Inc.

The Only Approved Method of Applying a Sanitary Lubricant to Food Processing Equipment

HAYNES Lubri-Film SPRAY

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U.S. Pat. Nos. 2,627,928 2,630,187 — 2,630,303 2,775,561 — 2,865,446 Other Pat. Pending Also Foreign Patents

A SANITARY PLASTIC TYPE SOLID FILM LUBRICANT

FORMULATED FROM U.S.P. LIQUID PETROLATUM AND OTHER APPROVED INGREDIENTS (Laboratory Controlled)

SANITARY • NON-TOXIC ODORLESS • TASTELESS

PHARMACEUTICALLY ACCEPTABLE

CONTAINS NO ANIMAL OR VEGETABLE FATS. ABSOLUTELY NEUTRAL. WILL NOT TURN RANCID — CONTAMINATE OR TAINT WHEN IN CONTACT WITH FOOD PRODUCTS

Lubri-Film should be used to lubricate

- Separator Bowl Threads
- Pure-Pak Slides & Pistons
- Pump & Freezer Rotary Seals
- Homogenizer Pistons
- Sanitary Plug Valves
- Valves, Pistons & Slides of Ice Cream, Cottage Cheese, Sour Cream and Paper Bottle Fillers, Stainless Steel Threads and Mating S. S. Surfaces
- and for all other Sanitary Machine Parts which are cleaned daily.

Haynes Lubri-Film Sanitary Spray Lubricant is entirely new and different. Designed especially for applications where a heavy duty sanitary lubricant is required.

Lubri-Film is a high polymer lubricant and contains no soap, metals, solid petrolatum, silicones nor toxic additives.

Provides a clinging protective coating for vital metal parts such as slides, bearings and other lubricated surfaces despite moisture.

PACKED 6—16 OZ. CANS PER CARTON.

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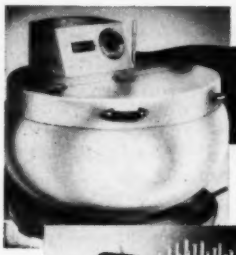
U. S. Department of Health, Education, and Welfare

A new manual, "Environmental Engineering for the School," has been developed jointly by the Public Health Service and the Office of Education. It will be issued late in October 1961.

This publication is designed for use by school administrators and architects, educators, school maintenance personnel, and public health workers.

Copies will be on sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.



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"Babcock Tester Manufacturers for Four Decades"

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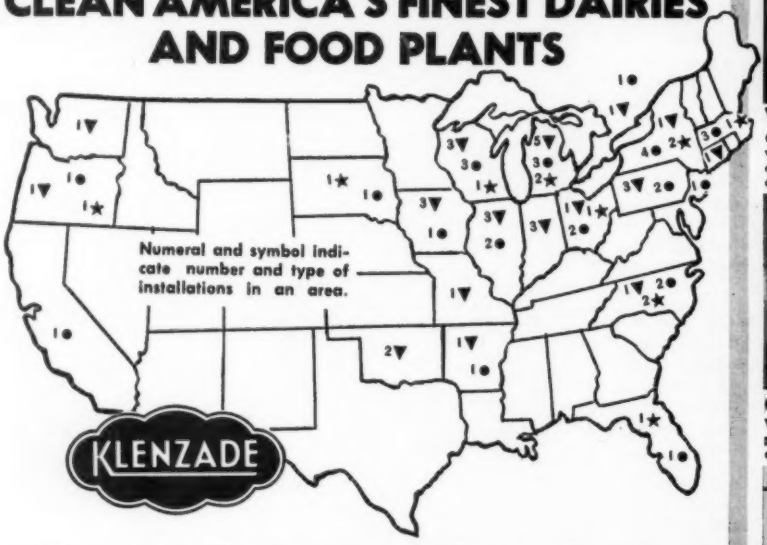

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Better Labor Utilization in Processing and Cleaning
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Improved Sanitation with Uniform Cleaning

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Complete "packaged" systems for washing tankers, tanks, vats, product lines, parts and HTST units. Easy to install, operate and maintain. Fresh detergent solutions used in each cycle to assure controlled sanitation.

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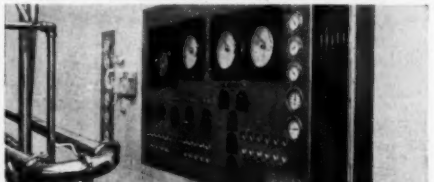
Versatile units with complete automatic control for total plant CIP applications. Specific cleaning programming for all types of equipment by positioning a single switch.



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supersedes infusion media for culturing the *Brucella* organisms. This medium serves ideally for primary or secondary isolation of *Brucella*, for the differentiation of species and for vaccine or antigen production.

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THE ONLY *Approved* SANITARY METHOD OF APPLYING A U. S. P. LUBRICANT TO DAIRY & FOOD PROCESSING EQUIPMENT

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U. S. P. LIQUID PETROLATUM SPRAY

U.S.P. UNITED STATES PHARMACEUTICAL STANDARDS

CONTAINS NO ANIMAL OR VEGETABLE FATS. ABSOLUTELY NEUTRAL. WILL NOT TURN RANCID — CONTAMINATE OR TAINT WHEN IN CONTACT WITH FOOD PRODUCTS.

SANITARY—PURE
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NON-TOXIC

This Fine Mist-like **HAYNES-SPRAY** *should be used to lubricate:*

SANITARY VALVES
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and for ALL OTHER SANITARY MACHINE PARTS which are cleaned daily.

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The Haynes-Spray eliminates the danger of contamination which is possible by old fashioned lubricating methods. Spreading lubricants by the use of the finger method may entirely destroy previous bactericidal treatment of equipment.

PACKED 6-12 oz. CANS PER CARTON SHIPPING WEIGHT—7 LBS.

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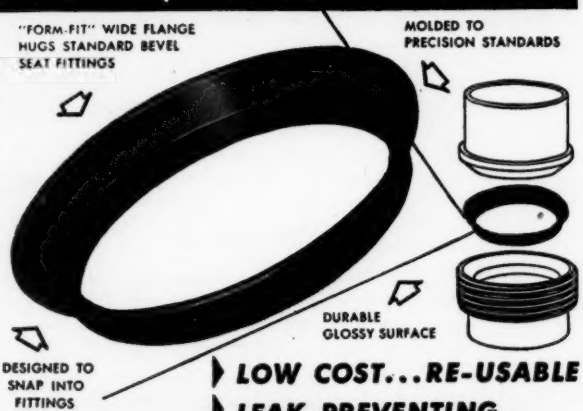
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SOME ANSWERS *for the man who plans to*

MAKE MORE MONEY MILKING!

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ANSWER: In modern milk plants and food processing factories, gone are open holding tanks. Milk is received in round tanks—completely sealed from outside contamination—air, dust, odors. Everything is designed for mechanical cleaning and sanitizing in-place. This is also the modern principle of the Universal Vacuum Bulk Cooler—protection of milk flavor and quality during storage on the farm. In addition, it eliminates a separate releaser or milk pumps—reduces clean-up labor, maintenance and repairs. Copper refrigeration system, fast cooling waffle pattern. Heavy stainless steel; thick foam insulation; structural steel reinforcing bars assure rigid support and accurate calibration; turbulent washing action for in-place cleaning and sanitizing.

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Why does Universal specify NARROW BORE INFLATIONS?

ANSWER: The new Universal narrow bore inflations not only assure better udder health but provide cleaner, faster milking.

Is there much difference in types of PIPELINE MILKER UNITS?

ANSWER: Yes. Cow comfort as well as thorough milking is important. Combined with narrow bore inflations, Universal Pipeline Milker Units by means of synchronized, controlled air release eliminate milk lock and rancidity; provide cow comfort and more milk let down.

Why do I need a MERCURY GAUGE?

ANSWER: Because a Universal Mercury Gauge assures positive vacuum for better udder health of your cows while increasing milk production.

Why are more Dairy Operators Switching to the Uni-Pulse MASTER PULSATOR?

ANSWER: Because the new Universal Uni-Pulse assures more positive, uniform pulsation and one unit can replace up to half a dozen single operating pulsators. It is another example of Universal's leadership in mechanical precision.

UNIVERSAL OFFERS A FULL LINE OF DETERGENTS, BACTERICIDES AND CLEANING COMPOUNDS FOR "GRADE A" MILK PRODUCTION

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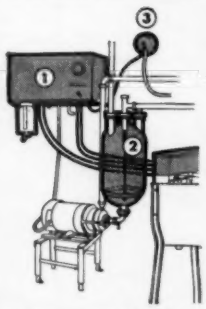

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- **LESS WATER**
- **SAVES TIME**
- **MORE CONTROL**

ANSWER: All Universal equipment is specifically designed for "Grade A" production and to simplify milking operations for any type of installation. Because of the importance of sanitary applications, Universal engineers are constantly developing special equipment such as complete, automatic, in-place washing with Air Injection control.

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Universal automatic in-place washing provides a full view Pyrex glass receiving vessel that does not have to be removed for pipeline cleaning.

3. AIR INJECTION OPERATION

Universal air injection vacuum washing application to Kleen-O-Matic operation, gives more thorough cleaning throughout the entire milking system and uses less cleaning solution. Air injection washing method draws solution through at high turbulent velocity.

WRITE FOR THE UNIVERSAL KIT FOR COMPLETE INFORMATION

FARMER-OWNED **Universal** MILKING MACHINE DIVISION

NATIONAL COOPERATIVES, INC.
ALBERT LEA, MINNESOTA
Branches in Waukesha, Wisconsin and Syracuse, N.Y.
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WORLD'S MOST COMPLETE LINE OF MILKING EQUIPMENT

DIFCO

New RAPID DISK METHOD

for Detection of

PENICILLIN in MILK

Reliable *Sensitive* *Practical*

Direct assay method of Arret and Kirshbaum (FDA) for determining presence of penicillin in milk and dairy products.

Media	BACTO – ANTIBIOTIC MEDIUM 1 BACTO – SPORULATING AGAR
Inoculum	BACILLUS SUBTILIS ATCC 6633 Standardized Spore Suspension in 1 ml. ampuls
Penicillinase	BACTO – PENASE CONCENTRATE in 20 ml. and 100 ml. vials BACTO – PENASE DISKS Standardized Impregnated Disks
Penicillin	STANDARDIZED IMPREGNATED DISKS 0.05 units, 0.1 unit and other concentrations

INFORMATION ON REQUEST

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MOLDED TO PRECISION STANDARDS
DURABLE GLOSSY SURFACE
DESIGNED TO SNAP INTO FITTINGS

LOW COST...RE-USABLE

LEAK-PREVENTING

NEOPRENE GASKET for Sanitary Fittings

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Tight joints, no leaks, no shrinkage
Sanitary, unaffected by heat or fats
Non-porous, no seams or crevices
Odorless, polished surfaces, easily cleaned
Withstand sterilization
Time-saving, easy to assemble
Self-centering
No sticking to fittings
Eliminate line blocks
Help overcome line vibrations
Long life, use over and over

Available for 1", 1½", 2", 2½" and 3" fittings.
Packed 100 to the box. Order through your dairy supply house.

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THE ONLY *Approved* SANITARY METHOD OF APPLYING A U. S. P. LUBRICANT TO DAIRY & FOOD PROCESSING EQUIPMENT

Haynes-Spray

U. S. P. LIQUID PETROLATUM SPRAY
U.S.P. UNITED STATES PHARMACEUTICAL STANDARDS

CONTAINS NO ANIMAL OR VEGETABLE FATS. ABSOLUTELY NEUTRAL. WILL NOT TURN RANCID – CONTAMINATE OR TAINT WHEN IN CONTACT WITH FOOD PRODUCTS.

SANITARY – PURE
ODORLESS – TASTELESS
NON-TOXIC

This Fine Mist-like **HAYNES-SPRAY** *should be used to lubricate:*

SANITARY VALVES
HOMOGENIZER PISTONS – RINGS
SANITARY SEALS & PARTS
CAPPER SLIDES & PARTS
POSITIVE PUMP PARTS
GLASS & PAPER FILLING MACHINE PARTS
and for ALL OTHER SANITARY MACHINE PARTS which are cleaned daily.

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The Haynes-Spray eliminates the danger of contamination which is possible by old fashioned lubricating methods. Spreading lubricants by the use of the finger method may entirely destroy previous bactericidal treatment of equipment.

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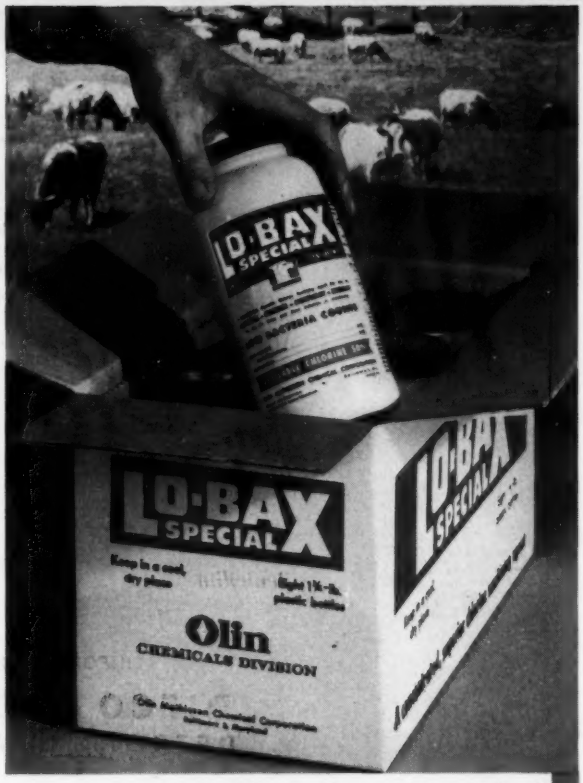

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Lo-Bax chlorine bactericides now come in unbreakable, non-corrosive plastic bottles . . . for more convenient handling and better product protection. The 8-bottle cases have a new look too . . . now each carton is a sparkling milk white. A free plastic measuring spoon comes in every 1¾-lb. bottle.

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